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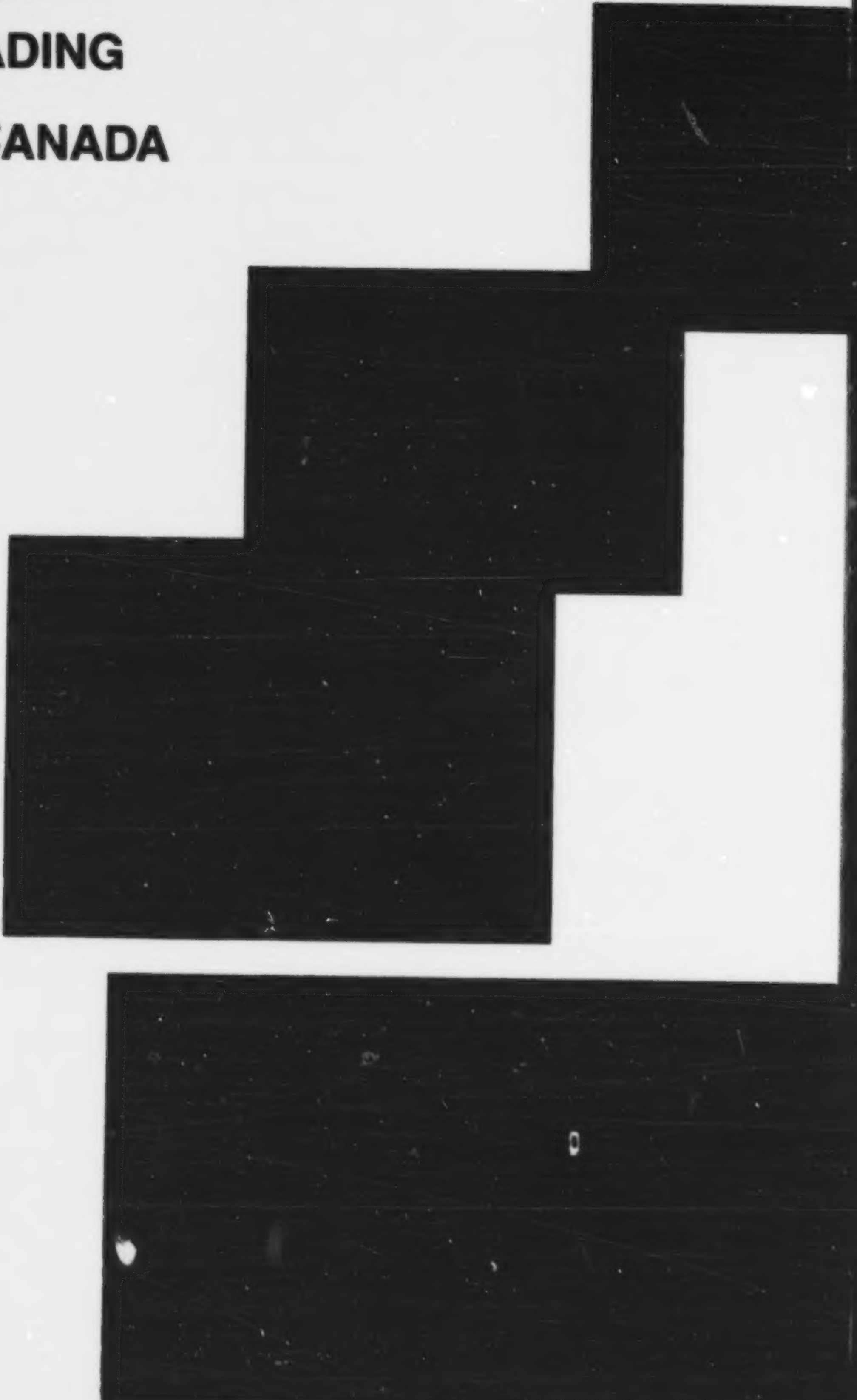
WHEAT GRADING
IN
WESTERN CANADA
(1883 - 1983)



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Our file Notre référence

December 1, 1983

Mr. H.D. Pound
Chief Commissioner
Canadian Grain Commission

The 1980's mark the beginning of the second century of major grain production in Western Canada and of public involvement in the establishment of the specifications and standards by which that grain is handled and merchandised. The present system, or systems, of grain grading evolved progressively over those first hundred years. As we consider new needs and new techniques it would seem appropriate to review that period and the influences which shaped this evolution.

The Canadian Grain Commission, the federal agency responsible for the public role in the development and administration of these rules and standards, was fortunate in being able to retain Dr. G.N. Irvine to undertake this review. Dr. Irvine, former Director of the Commission's Grain Research Laboratory and recognized as one of the world's leading cereal chemists, had played a significant role in this development since first joining the Commission in 1950.

In this work he has made a penetrating analysis of the hows and whys of our present systems. Such an assessment is a most important factor in any consideration of future specifications and new grading technology.

Dr. Irvine's analysis of the forces and events of this first century of Canada's grain industry is unique in its coverage. As such, I would recommend that the Commission make the study available for distribution.

E.E. Baxter

E.E. Baxter
Special Advisor

Canada

THE HISTORY AND EVOLUTION OF THE WESTERN CANADIAN WHEAT GRADING AND HANDLING SYSTEM

G. N. Irvine

CONTENTS

Page

Preface

PART 1 - BACKGROUND TO THE WHEAT GRADING SYSTEM

1. Evolution of "Manitoba Red Fife" 1
2. Development of the International Wheat Trade 7
3. Origins of the Chicago and Milwaukee Grading Systems for Wheat 11
4. Origins of the Canadian Grading System 17
5. The Situation in Minnesota and Manitoba, 1885 25

PART 2 - THE FIRST PERIOD IN WESTERN CANADA: 1885-1935

6. The General Inspection Act, 1885-1886 31
7. The First Fifteen Years of the "Manitobas" 35
    - Increased Inspection of Western Wheat 37
    - The Non-statutory Grades 37
    - The Demand for a Western Standards Board for Western Grain 41
    - Legislation to Provide for Commercial Grades 41
    - The Proliferation of Grades 42
    - An End to the Adulteration of Manitoba Grades in Eastern Canada 43
    - The Need for Closer Regulation of the Grain Trade 44
8. The Landmark Legislation of 1899 47
    - The Beginning of the Export Standard 47
    - The Farmers' Right of Appeal 47
    - Manitoba Inspection of Western Wheat 48
9. Grain Handling Becomes Uniquely Canadian 49
    - Legislation for Cleaning of Grain 50
    - Rationalizing the Legislation 51
10. The Canada Grain Act, 1912 53
    - The Proliferation of Off-grades 53
    - Proposal to Establish Sample Markets 54
    - Reaction to Stem Rust Epidemics 54
    - The 1925 Revision of the Act 54
    - Grade Definition Changes 55
    - The Ambivalent No. 2 Northern 56
    - Variety Licensing 56
    - Quality of Garnet Variety Questioned 57
11. The Test of the "Equal to Marquis" Principle 59
    - Reaction to Garnet Wheat 59
    - Proposal for Garnet Grades 59
    - Establishment of Garnet Grades 61
    - Quality Tests for New Varieties 62
    - The Western Standards Board Becomes Quality Custodian 62
    - International Collaborative Testing 63
    - Variety Identification by Grain Inspectors 63

Page

12. The Grading and Handling System Matures 65
    - Setting up Quality Protection 65
    - The Practicability of Grading Protein Content 66
    - Evaluating Grain Drying at Terminals 67
    - The 1930 Revision of the Canada Grain Act 68

13. Fifty Years of the "Manitobas": An Overview 71

PART 3 - THE SECOND PERIOD IN WESTERN CANADA: 1936-1981

14. Predominant Events and Trends 81

15. The Garnet Problem: Phase Two 83

16. Tidying Up the Grades 87

17. The Second World War Years 89

18. The Period of the Post-War Wheat Agreements: 1946-1967 91
    - Durum Production Expands 91
    - The New Varieties of Hard Red Spring Wheats 93
    - Canada Seeks New Markets 95
    - The Increasing Importance of Protein 97
    - The Prospect of Higher Yields 98
    - The Winter Wheat Option 102
    - The Conacher Study of Grain Handling and Grading 106

19. The Current Era: 1968-1981 107
    - Updating the Canada Grain Act 107
    - The New Grades: The End of the "Manitobas" 109
    - The Implementation of Protein Segregation 111
    - Other Grade Changes 120
    - The Current Grades of Wheat in Western Canada 122

APPENDIX A: The Vehicles of Federal Legislation Dealing with the Grading and Handling of Wheat 125

APPENDIX B: The Role of Science and Technology in the Evolution of the Wheat Grading System 127

APPENDIX C: The Quality "Enhancement" that Occurs with Blending Different Parcels of the same Grade of Wheat 131

PREFACE

Grading systems for wheat were introduced by the grain merchants of the cities of Chicago and Milwaukee in the middle of the nineteenth century. They were essentially a mid-western North America development, precipitated by the opening up of vast areas of wheat-growing land west and south west of Lake Michigan. The population of North America was comparatively dense in the east, while great surpluses of wheat were being produced in the sparsely settled areas of the mid-west. It was to deal with the burgeoning flow of grain from the mid-west to the eastern seaboard, and also to overseas markets, that grading systems evolved.

A similar situation had occurred in Southern Russia at the beginning of the nineteenth century but, presumably because the producers were wealthy Kulaks and railways had not yet been introduced, the "old world" system of handling grain in sacks was still viable. It also occurred in the Argentine in the latter half of the nineteenth century, and in Australia as well, but still without producing anything new in grain handling methods.

Probably it was the American innovation of bulk handling, coupled with the great distances the grain had to travel to market, first by water and later by rail, that created the need for grading systems. Western Canada, which in the period following 1880 was the last North American area to identify a need for a better grain handling system, had American innovation and experience to profit from. Accordingly it is not surprising that the West started with bulk handling in 1883, and with a highly sophisticated system of grades in 1885, when the world outside North America was still handling wheat in sacks and saw no need for grades. Eastern Canada was then producing some 30 million bushels of wheat annually, yet felt no great need for branch line railroads, bulk handling or complex grading systems. Yet before Western Canada produced 10 million bushels of wheat in a year, the railways and the bulk handling and sophisticated grading systems were already in place.

This book traces the evolution of wheat grading systems in North America, and especially in Western Canada, and provides a perspective from which to assess the present system. It attempts to answer the question: Why do we do what we do?

The major features of our grading and handling system were established 75 years ago and the reasons for many of the things we do today are buried in the archives. My task has been to exhume and examine such information as is still available and use it to present a continuous account of how we got to where we are today. Perhaps the reasons behind some of the things we are doing are no longer valid, yet we should know "from whence we came" so that we can decide intelligently where we should be going.

G. N. I.
Winnipeg, Manitoba
May 1982

PART 1

BACKGROUND TO THE WHEAT GRADING SYSTEM

CHAPTER 1

EVOLUTION OF "MANITOBA RED FIFE"

For thousands of years mankind ground wheat into meal or flour between stones, and indeed still does so today in some parts of the middle east and in the homes in India and Pakistan. The favored wheats for grinding between stones have been soft wheats with a "white" bran; these are the easiest to reduce to flour and give a whiter appearing flour than do soft wheats having a deep reddish bran. Amongst the hundreds or thousands of varieties of wheat which have evolved since man first began its cultivation, there are soft, medium and hard (flinty) types; white, amber, red and even purple wheats; winter and spring types; and many possible combinations.

In general, winter wheats yield more grain than spring wheats and, as a rule, are softer in endosperm texture. But they cannot be grown in the more northerly climates of the world, where the winters are too cold for winter wheats to survive. Spring wheats, however, are adversely affected by the wet weather which frequently occurs during harvesting and causes the wheat to sprout. Of the various types of spring wheats, it was observed long ago that red wheats did not sprout as readily as white or amber wheats harvested in wet conditions. Red spring wheats, then, seemed to be more reliable for harvesting sound grain.

During the summer growing season most of the northerly parts of the world have quite limited rainfall. This generally results in wheat which is hard, vitreous and normally considerably higher in protein than wheat grown under conditions of more generous rainfall.

In Canada, at the time of Confederation, Ontario was growing substantial quantities of white winter wheat to supply an aggressive milling industry which exported flour to the West Indies, the Mediterranean area, and to parts of the United States. As some parts of Ontario were suitable for growing only spring wheats, the red varieties were grown there and they were often hard and vitreous. This was especially true of the variety Red Fife, which was popular with producers because of its good yield and resistance to smut. The milling industry, however, did not like this hard red spring wheat and it was quite markedly discounted in the marketplace against the more easily milled soft white winter wheat. Even the simple grading system which existed at the time specified that, within the spring wheat category, "Flinty Fife" wheat could grade no higher than No. 2.

The acquisition, by Canada, of Rupertsland from the Hudson Bay Company led rapidly to the establishment of the Province of Manitoba in 1870. The way was now open to secure the Great Plains and parkland areas west from Fort Garry to the Rocky Mountains for Canada, by filling the country with homesteaders who would develop the land and grow food crops. This had happened south of the border, in the United States, following the end of the Civil War, and the Canadian Government hoped to see it repeated here.

Experience at Red River over the previous fifty years had shown by 1875 that Red Fife wheat, which had originated in Ontario but had come to Fort Garry from Minnesota, was a good wheat for the area. Farmers recognized its high production reliability, even if the millers didn't like it and would pay higher prices for such exotic-sounding soft white spring varieties as Golden Drop, Lost Nation, or White Russian.

In Europe at this time, and also in Minneapolis, a revolution was underway in the flour milling industry. Some years before, a Frenchman, Perrigault, patented a device now known as a purifier, which was to change completely the technology of flour milling. Until its introduction grain had been ground on stones, with the flour sieved out repeatedly. For better-quality flour, the process relied upon the relatively soft, easy to grind white wheats, because the fewer grindings required, the less bran was ground into the flour.

The new purifier allowed separation of the bran from the coarse endosperm particles by sieving and air flotation. That is, coarse grindings were run over a series of sieves with air blown through from the bottom; the bran particles, being lighter than the endosperm material, floated on the top and overtailed the sieves. The endosperm passed through the sieves and was collected in "purified" form for grinding a second time into flour, this time without the bran to spoil the flour's color.

This concept was rapidly exploited by millers and quickly led to the adoption of the gradual reduction process, which used chilled iron rollers in place of mill stones for grinding. The first step was to break up the wheat kernel into chunks, which allowed the bran to be removed with sieves and purifiers, and produced clean middlings but not yet any flour. In the second step, the middlings were ground on smooth iron rollers to produce a very fine, very white flour which came to be known as "Patent" flour (referring to the patented machine, the purifier, used in its production).

This revolution in the milling process brought with it further change. Now what was wanted in the grist was the hard, flinty wheat formerly despised by millers, since it did not produce much flour in the early "breaking" stages of the milling process and gave the largest yields of purified middlings from which to grind the patent flour. The hard spring wheats were also found to be generally higher in protein (i.e. they contained more gluten) than the soft wheats. Their higher-protein flour produced a much better loaf of bread and took up considerably more water in doughing, so that bread yields from each barrel of flour were significantly greater than for bread made from soft wheats. The new milling system, combined with a plentiful supply of hard red spring wheat grown by the homesteaders in Minnesota and the Dakotas, plus a cheap power source in St. Anthony's Falls, caused Minneapolis to become, by 1890, the greatest milling centre in the world. (In that year alone, Minneapolis mills ground 34 million bushels of wheat to produce 7,434,000 barrels of flour.)

It was the Minneapolis millers who first established the reputation of and demand for Red Fife wheat grown in Manitoba. By 1876, Manitoba Red Fife was being shipped by river to the Twin Cities, and by 1880 the millers there were offering premiums for it even over Red Fife grown in the Dakotas. By then they could import the "Manitobas" by rail on the newly opened Pembina Branch connecting Winnipeg with the border, and the U.S. rail connection to St.

Paul.

Settlers were arriving in Manitoba in modest numbers, emigrating mostly from Ontario where the economics of wheat production were turning a little sour. (The ever swelling tide of wheat produced in the United States as its frontier advanced rapidly to the foothills of the Rockies had created a depressed price for soft wheats.) Settlers were also coming to Manitoba from Great Britain, and there were scattered colonies of Mennonites, Swiss, and French Canadians, some of whom had emigrated from the United States.

A major objective of Sir John A. MacDonald's "National Policy" then being implemented by the Canadian Government was to secure the West for Canada by filling it with homesteaders, and by so doing also to provide safe, new markets for the manufacturers of Ontario and Quebec. The first instrument of this policy was the national railway, with the Canadian Pacific Railway (C.P.R.) being granted Crown lands adjacent to its rail lines in the most fertile areas of Western Canada. By 1881 the government of Manitoba, the government of Canada, and the C.P.R. were all actively promoting emigration to the West. But the competition for new settlers from Europe was very strong, not only from the United States, where immigration had not yet reached saturation point, but also from New Zealand and Australia, which offered both a more propitious climate than that of the Canadian Prairies and very attractive financial assistance. Hence, settlement in Western Canada progressed rather slowly as the railway headed for Winnipeg from Port Arthur in the early 1880s.

To attract settlers a gimmick was needed, and that gimmick proved to be Red Fife wheat. Suddenly it had become, by all accounts, the finest wheat in the world for milling bread flours. Statistics on yield in Manitoba were indicating that Red Fife was yielding up to 40% higher than wheats produced in the older areas of the United States and Ontario. It was even out-yielding the same variety grown in Minnesota and the Dakotas.

Farmers were openly encouraged to grow only Red Fife wheat. A poster prepared jointly by the milling companies was circulated throughout the province in 1882, the year the Ogilvie Milling Company completed the first roller mill in Manitoba. It announced:[1]

> IMPORTANT TO FARMERS. The standing of Manitoba wheat abroad has been seriously injured by the large proportion of Canada Club and other soft mixed varieties produced last year (1881). Pure Red Fyfe is the most valuable wheat that can be produced here, and it is the variety upon which the reputation of the "New North-West" as a wheat producing region will mainly depend. No soft or mixed wheat is worth as much by fifteen cents per bushel, and this difference in price will hereafter be made by the undersigned millers and wheat buyers. Farmers will do well to consider that soft wheat can be raised anywhere, while pure Red Fyfe requires our soil and climate, and also that pure Red Fyfe is always sought for by millers, while other varieties are frequently rejected. Sow only Red Fyfe, and after you have harvested it do not risk spoiling it by careless stacking.

Ogilvie Milling Co. Portage Milling Co.
A.W. Ogilvie & Co. Jas. A. Graham for H. B. Co.
(Note the spelling of "Fyfe," which was changed to "Fife" in the early 1900s.)

The Board of Agriculture of the province of Manitoba undertook to secure and distribute stocks of Red Fife wheat and urged "... the necessity of discontinuing the growing of soft varieties and encouraging the sole cultivation of Red Fife...".[2] The federal Minister of Customs waived the duty on stocks of Red Fife seed coming from the U.S. The Canadian Pacific Railway announced it would move the seed stocks of Red Fife wheat free of charge, to make it available to farmers. And the Federal Government was being lobbied by the Deputy Minister of Agriculture for Manitoba to revise the primitive grading system that had served Ontario and Quebec for twenty years.

It was also recognized that an official framework was needed for marketing Manitoba's superb wheat to the growing urban masses in Europe, who then were being sold wheat and flour from Minnesota. The first step was to remove the discrimination entrenched in the Inspection Act of 1874 which ruled that "Flinty Fife" wheat could grade no higher than No. 2. This was done in 1883 and foreshadowed the great consideration the federal Government was to exhibit towards the producers and the grain industry of Western Canada over the next thirty years - until immigration came to a halt with the First World War. "Flinty Fife", which was to be known in Western Canada and around the world as Hard Red Fife, could henceforth be graded into any grade for which it was otherwise eligible, provided it was grown west of Port Arthur.

Prior to 1883, the year that the C.P.R. was completed between Port Arthur and Winnipeg, wheat produced in Manitoba was bought largely by local mills or was exported to the United States. There were three mills in Winnipeg with a capacity of 1,100 barrels of flour per day, which at full capacity could process some 1.7 million bushels of wheat per year. Wheat sold to the local mills was bought on a sample basis, since buyer and seller were both able to view the wheat simultaneously as it was delivered to the mill. Wheat moving to Minneapolis, however, may have been bought by buyers in Winnipeg on a sample basis but was doubtless sold to Minneapolis buyers on the basis of one of the Minnesota grades then current for Hard Red Spring wheat, which were adapted to the new era of hard wheat milling in roller mills. (Minnesota had already acquired a reputation for the quality of its wheat and of its flour in Europe, through exports from the Port of Duluth.)

In Canada, grades for spring wheat were defined in the Dominion of Canada Inspection Act of 1874, but these grades had evolved during the heyday of soft wheat milling with stone mills and were no longer pertinent in Western Canada. The Manitoba Department of Agriculture reported in 1883 that "...grading was regulated by a Dominion Act and there was no provision for it being done at local stations, but only at large shipping points."[3]

Consequently the Manitoba Deputy Minister of Agriculture, in a letter to the Minister of Internal Revenue in Ottawa, urged: "...It is very desirable that a system of wheat inspection be established here, and that the province should no longer be dependent on Duluth or other places outside its limits for its inspection."[4]

In 1883 the Inspection Act of 1874 was amended[5] to add the City of Winnipeg to those cities whose Boards of Trade were empowered to establish Boards of Examiners to recommend candidates for appointment as inspectors. This resulted in the recommendation of Mr. William Clark for the position of Inspector of Grain at Winnipeg. Clark performed the function from 1884, but was not officially appointed until 1885. Meanwhile, in 1884, by federal order-in-council, the Manitoba Inspection Division was established with its boundaries defined as the City of Winnipeg.

In 1883 the Manitoba Government made a strenuous effort to produce information on the grain industry in the province, to further entice settlers to come and take up land. Correspondents selected from each township were sent an extensive questionnaire to complete which, when one considers what the mail service must have been like at the time, achieved a remarkably good response. The replies were summarized and used to produce a series of crop bulletins, which were issued throughout the growing and harvesting season, and distributed worldwide. The wheat crop of 1883 was estimated at 6.25 million bushels and it was further estimated that 2.5 million would be available for export. It was noted that "...Owing to low prices obtained for soft wheat in 1882 the percentage of Red Fife has markedly increased in 1883".[6]

Early in 1884 the C.P.R. completed its first grain terminal at Port Arthur, which in that year handled about 1.5 million bushels of grain, most of it wheat.

References:

1. Report of the Department of Agriculture and Statistics of the Province of Manitoba for the year 1882, P. 37.
2. Department of Agriculture and Statistics report, 1882, p. 14.
3. Report of the Department of Agriculture, Statistics and Health of the Province of Manitoba for the year 1883, p. 258.
4. Department of Agriculture, Statistics, and Health report, 1883, p. 268.
5. 46 Vict. Bill 104, passed April 27, 1883.
6. Department of Agriculture and Statistics of the Province of Manitoba, Crop Bulletin No. 1, 1883, p. 3.

CHAPTER 2

DEVELOPMENT OF THE INTERNATIONAL WHEAT TRADE

Wheat has been traded since the beginning of civilization, as we know it, in the near east five thousand years ago. The cultivation of the cereal crops, in which the producer was able to grow more food in a year than was necessary to support himself and his family, made possible the establishment of larger communities and eventually cities and with them civilization. But this trade in wheat was done over distances that donkeys or oxen could cover in a day or two, and necessarily in small quantities. Larger amounts were assembled in settlements situated on water routes, and inter-city and inter-country movement of wheat by barge or sailing vessel had developed by the time of the Greek and Roman Empires, neither of which was self-sufficient in wheat.

There was little development of the trade beyond this scale for another two thousand years. The basics became well established, with the producer bringing his wagonload of wheat to a merchant where the price was haggled in the presence of the product. The merchant would store the wheat until larger quantities were assembled, and then either sell it to another entrepreneur or ship it to market, often on speculation that he could make a profitable sale. Since the producer sold his wheat to a merchant (or to a miller) for cash, and it might be several months before the final transaction took place, various forms of financing and credit were necessary. Allowance also had to be made for hazards such as wars, piracy, natural disasters, and revolutions, all of which influenced the prices established at various points in the chain. Consequently, by the end of the eighteenth century the general framework of the business and its necessary appurtenances such as insurance, credit, contracts, sample trading and arbitration, were well established.

Up to that time the product had not changed very much. Wheat was sown by hand on land prepared using animals and primitive ploughs and harrows. It was gathered by sickle, scythe and cradle, and was stooked or stacked in various ways to allow it to dry out and to protect it from the elements until it could be threshed. Threshing was done by hand using a flail on a threshing floor of clay or hard mud or stone. The wheat was then winnowed and the clean grain placed in a container.

Wheat delivered to a merchant from such an operation might be very dry or very damp, depending on the country of origin and the local harvest conditions. It might also contain weed seeds, chaff, wheat heads, straw, clay pellets, dirt, adhered mud, animal droppings, bird droppings, rodent droppings, or admixtures of other cereals. These admixtures were not included in the wheat deliberately, but reflected the methods of field husbandry, harvesting, threshing and storage. Thus expectations were not high that clean, sound wheat would be delivered from farms.

Since the miller or merchant often needed the wheat, the tendency was to pay much the same price regardless of its quality. This led farmers to be less careful, or even to add what is now termed dockage to wheat which was considered to be above the acceptable market "standard." Similarly, a merchant assembling wheat for "export" would be sure to see that the wheat he sold carried all the worthless impurities the market would bear before it left his hands.

The industrial revolution, which occurred first in the United Kingdom (U.K.) and later in Europe, created the first significant changes in the international wheat trade. With the movement of people from the rural areas into the factory towns and the growing cities, bread became the staple food. By 1846, when the Corn Laws were repealed in England, it became apparent that industrialization would lead to a reliance on wheat imported from wherever surpluses were available.

The first source was southern Russia where, as the Turks were forcibly expelled, steps were taken to encourage colonization and so establish Russian "sovereignity." This led to vast stretches of land being opened up for cereal growing and the port of Odessa, which was established in 1794, soon became the centre of a flourishing wheat trade. Wealthy Russian landlords moved into the area, bringing with them serfs to work the land and build great manor houses for their owners. It was not long before more wheat than could be consumed by the local population was being produced, and, as there were no merchant flour mills to absorb the surplus, the wheat was used to feed the workers of the industrial revolution in Europe, and especially in the U.K. But when the Suez Canal opened in 1869, the British began looking to India as a potential "bread basket of the empire." Australia, too, was beginning to produce more wheat than it needed, as were California and the Argentine. By 1875 wheat from all of these countries was flowing to Liverpool, along with small quantities from eastern Canada and from the American mid-west.

This burgeoning wheat trade provided bread to fuel the Industrial Revolution. That great social upheaval, in its turn, rapidly revolutionized the wheat trade by its demand and technological impact on production, handling and utilization. The new land areas which became available for production of cereals in the nineteenth century permitted non-landowner families for the first time to acquire land and escape the rigidly established land ownership monopolies in their native countries. Enormous land holdings became possible so that, towards the end of the century, farms ranging from 1000 to 50,000 acres were not uncommon in Australia, Argentina, the north central U.S., and western Canada. These large holdings were made possible by the rapid advances in farm machine technology, especially during the second half of the century. Multiple ploughs, seeders, harrows, reapers, headers, binders, and threshing machines followed one another in rapid succession, soon to be propelled by the great steam tractors which began to take the place of animals as a means of motive power. One man, with help from his children and from seasonal farm hands, could produce wheat far beyond the needs of either his family or the local miller.

The marketing system was changing too. The country elevator, as we still know it today but using steam or gasoline power, was developed in the first half of the nineteenth century in the United States, just in time to exploit bulk commodity movement by rail. (The railways gradually spread throughout the newly settled areas of North America, the Argentine, and Australia during the second half of the century.) Suddenly there was no more manhandling of sacks of grain. Previously, wheat buyers had operated flat storage for the sacks at strategic gathering points on roads, trails or rivers. Now, taking advantage of the fact that wheat flows like water under gravity, the new elevators greatly speeded grain movement by unloading it rapidly from farmers' wagons and just as rapidly filling boxcars, either mechanically or by gravity flow. This new efficiency helped reduce the cost of gathering and moving grain over the long distances to export ports.

The milling industry was one of the earliest to benefit from the industrial revolution. The adoption of steam power rendered it, for the first time, independent of the vagaries of wind or water. Through Oliver Evan's inventions and application of other developments to flour milling in America, by the early years of the nineteenth century milling became the first continuous, automatic process. The labor requirement was cut in half but the initial capital cost of mill construction was increased, resulting in larger, more efficient mills being built and the milling business being concentrated in large population centres. This, in turn, led to the development of primary wheat markets where the mills were concentrated, in centres such as St. Louis, Milwaukee, Chicago and, later, Minneapolis.

By the middle of the nineteenth century the principal of the middlings purifier was known, and by 1880 its adoption had led to a complete revolution in the milling business. Perfected in the Minneapolis mills, the purifier gave hard spring wheats indigenous to the area a real advantage over the soft winter wheats previously cherished by the milling industry. Its adoption, and that of the European roller mills in place of the traditional millstones, led rapidly to the construction of huge merchant mills producing higher quality flour at cheaper prices than could be made by the older systems.

These large merchant mills, often with several in one area operated by the same company, encouraged the development and exploitation of brand names over wide areas of the U.S. and in Europe. The brand-name flours were accepted by commercial bakers and housewives alike, creating a continuing demand for uniform quality from batch to batch. The need for uniform quality flour in turn demanded not only reliable wheat supplies but also exacting quality control of the wheat. Wheat supplies had to be assured for months ahead, and to ensure stable prices purchases had to be hedged, leading to the establishment of futures markets in the major primary market areas.

But, regardless of whether wheat was being supplied for cash markets, futures markets, or warehousing operations, it was necessary to classify it more specifically than simply as spring wheat or winter wheat. Consequently, primitive grading systems came into existence, presided over by inspectors appointed by the Boards of Trade or Chambers of Commerce in the primary market centres. Grades and inspection allowed wheat to be handled in bulk without having to preserve the identity of specific lots; warehouse receipts could be issued for a given quantity of a specific grade which would have an immediate cash value closely reflecting values for that grade in the cash market.

These early systems seem primitive compared with the sophisticated systems that have evolved over the past hundred years, but at the time they were a very substantial improvement. Previously, uncertainty over quality and value at every step in the marketing process tended to depress prices, and to create wide spreads in prices between each point in the gathering and forwarding process. As confidence in the new system grew, so did trade, causing wheat production to become the most stable element for the homesteader's great gamble in the new lands of North America, the Argentine, and Australia. Consequently wheat production mushroomed in the last quarter of the century, and bread became the staple food of millions of urban dwellers in America and Europe.

CHAPTER 3

ORIGINS OF THE CHICAGO AND MILWAUKEE GRADING SYSTEMS FOR WHEAT

Throughout recorded history grain has been traded between surplus and deficit areas of the world. The areas may be adjacent, as between a country farm and a nearby city, or far apart, as between Australia and the United Kingdom. When the areas are adjacent the conditions of sale are simple: the buyer and seller confront each other in the presence of the grain and haggle over its value until they arrive at an agreed price. The haggling involves estimates of the overall quality of the grain, the amount of dirt, etc, present, and the anxiety of the seller to sell and the buyer to buy.

When areas are widely separated, at least one entrepreneur (and more often several) is involved between the producer who sells his grain and the processor who buys it and converts it into a food product. The intermediary negotiators know of a deficit situation (i.e. a buyer or market) and identify a surplus situation (i.e. a supplier) which is likely to exist for a reasonably long period. The buyer wants to know what kind of product the supplier has to offer and asks to examine a sample which is claimed to represent what the supplier has to sell. The buyer then makes an offer to purchase a specified quantity, with the provision that the delivered grain is equal in quality to the sample. Sometimes the contract to purchase includes a provision for discounts should the delivered grain not equal the sample, or for arbitrators to intervene in case a dispute arises over the quality of the grain.

This is essentially how grain markets operated for centuries, whether in the Mediterranean 2,300 years ago or in Europe in the late 1800s. Much grain is still traded in this way, with the major "quality" specification being a statement of origin. The system, however, has certain limitations. The major objection is probably that the buyer cannot know, except within certain extremes, what quality of grain he will receive. If it is not up to standard he collects the penalty agreed upon for deviation from the sample, but he may then find that he cannot conveniently use the product he has purchased.

Grading systems were developed to more accurately circumscribe quality and as far as possible eliminate such unpleasant surprises. By defining certain grain qualities in writing, the grade definition can become part of a contract and be backed up by a type sample which the seller indicates will govern the grading of the product when it is dispatched to the buyer.

When wheat begins to move in significant quantities, it usually must be warehoused at some point in its movement to an ultimate destination. The warehouseman is not a grain merchant, but functions as a custodian and often as a transfer agent, receiving grain from wagons or railway cars, storing it, and subsequently delivering it into other railway cars or vessels. The warehouseman charges a fee for safekeeping and transfer, which is assessed against the party who calls for delivery of the grain. Delivery is made upon surrender of a warehouse receipt originally tendered by the warehouseman to the party putting the grain into storage. The warehouse receipt, provided it represents a known quality and quantity of grain (which has been assessed by a reputable organization such as the Chicago Board of Trade or the Canadian Grain Commission, and identified on a grade certificate) is negotiable in the marketplace. It may be readily sold for cash to an intermediary by the depositor of the grain, and ultimately may be purchased by someone who wants to buy and remove that quantity and quality of grain from the warehouse.

A grading system is essential if a wheat buyer is to be assured he will receive the quality of wheat from the warehouse that he has paid for. A warehouse receipt simply saying "wheat" would have little value in the marketplace, since the warehouseman would be free to deliver any quality of wheat against presentation of the receipt. Boards of Trade or Chambers of Commerce in centres where there were grain warehouses defined a general "standard" for wheats of various origins and types. To ensure that most grain produced of a given type could meet these standards, however, they set the standards conveniently low. In turn, this means that no clean, high grade wheat was likely to be presented for storage in terminal warehouses. Most farmers sold their wheat to merchants who had local storage depots along rivers or railway lines. These merchants - and sometimes the farmers themselves - would mix good wheat with damaged grain, screenings, other grain, etc, so that it would be just good enough to meet the "standard" when they presented it at the warehouse.

As the grain fields of the U.S. mid-west opened up, first to the west, then to the south, and eventually to the north of Chicago and Milwaukee, their surplus production was moved by river, rail, or wagon to these centres for onward movement to Canada or the eastern seaboard of the U.S. At first most of the grain was used by the mills in Canada and the U.S., but later it also began to move to Europe and the U.K. But the quality of the "standard" wheats such as Chicago Club, Chicago Spring, and Chicago White Winter left much to be desired. Accordingly, first the Chicago Board of Trade, and shortly thereafter the Milwaukee Chamber of Commerce, decided that the system must be refined and greatly tightened up so that "...Spring Wheat may bring in this market a price in proportion to its true value..."[1] They proposed, in 1858, to establish a series of grades for wheat based on cleanliness and bushel weight. Chicago began by listing four grades of spring wheat:

Club Wheat - clean, 60 lbs per Winchester bushel
No. 1 Spring - clean, 56 lbs per Winchester bushel
No. 2 Spring - reasonably clean - 50 lbs per Winchester bushel
Rejected - 40 lbs per Winchester bushel

The Chicago Board of Trade appointed a Chief Inspector for the area under its jurisdiction to ensure uniform application of the grading standards by the various local inspectors. At the same time agreement was reached with the warehousemen to keep separate grain which had not been inspected from grain which had been inspected, and always to deliver the proper grade and weight of wheat against a warehouse receipt identifying a specific quality.

An indication of the low quality of spring wheat which was arriving in the Chicago market is given by the statement of the Board of Trade that:

> A large proportion of the Spring Wheat that has arrived at this market since the 1st inst., has been found to weigh from forty-five (45) to fifty (50) pounds per measured bushel, and consequently, has been inspected as rejected; and whereas, a manifest injustice would be done to parties owning such wheat, if it is still permitted to pass as such, and be mixed in the warehouses with wheat falling considerably below that quality, both in point of weight and value; therefore,
>
> Resolved, That from and after the passage of this resolution, all Spring Wheat arriving at this market, and weighing per measured bushel forty-five (45) pounds and under fifty (50) pounds, shall be inspected and graded as 'No. 2 Spring Wheat'.[2]

At the same time the grade of Club Wheat was abolished, because statistics for the year indicated that only 2100 bushels qualified as Club Wheat out of over 3 million bushels of spring wheat presented for inspection. A further innovation adopted by Chicago and Milwaukee in 1858 was to deal in weight rather than volume (as had been done throughout the eastern U.S. and continued to be done in other areas for a further twenty years). Converting weight to bushels on a fixed basis eliminated any advantage to the producer in reducing the bushel weight and, by including minimum bushel weights in the grades, farmers were encouraged to deliver high bushel weight wheat into the system for maximum returns. A bushel of wheat was defined as weighing 60 pounds. When the wheat was weighed, the weight was converted to bushels at a standard conversion of 60 pounds to the bushel, regardless of the actual bushel weight of the grain. This was a revolutionary step to encourage the producer to forward clean, high grade wheat.

Under the previous system, grain was weighed but paid for by the bushel volume. To determine the number of bushels, bushel weight was estimated by generally using a half gallon brass bucket. For a given weight of grain, the lower the bushel weight, the greater the number of bushels paid for. Thus farmers became expert at lowering the bushel weight of their grain by including wheat heads, admixtures, dirt and high moisture grain. Wheat of such low bushel weight is almost unheard of today.

These measures produced the desired effect, for by 1860 the grades of spring wheat were again revised, this time re-establishing two grades for Club Wheat and revising the minimum bushel weights dramatically upward (by three pounds for No. 1 Spring wheat, and six pounds for No. 2 Spring):

> Extra Club - To be sound, well cleaned, and to consist of pure Club Wheat, weighing not less than 60 pounds to the measured bushel.
>
> Northwestern Club - To be sound, well cleaned, and to comprise all kinds of bright amber-colored Spring Wheat, weighing not less than 59 pounds to the measured bushel.

No. 1 Spring - The berry to be plump, well cleaned, free from other grains, and to weigh not less than 59 pounds to the measured bushel.

No. 2 Spring - To be sound, but not clean enough for No. 1, and to weigh not less than 56 pounds to the measured bushel.

Rejected Spring - All unsound, unmerchantable Spring Wheat and to weigh not less than 45 pounds to the measured bushel.

By 1869 the Club Wheat grades had been dropped again and two new grades had been introduced, one for Hard Spring wheat No. 1 and the other for No. 3 Spring. It is interesting, however, that having changed the habits of producers by introducing bushel weight minimums for each grade, the principle was now abandoned for all grades except the new No. 3 Spring wheat which was to have a minimum weight of 54 pounds to the measured bushel. For all other grades, the bushel weights were to be largely controlled by standard samples established each year. The provision for a grade of Hard Spring wheat was, however, limited by a proviso that "...Black Sea and Flinty Pfife wheat in no case will be inspected higher than No. 2, and Rice Wheat no higher than No. 3".[3] This limitation evolved from the prejudice against the Hard Spring wheats which existed among millers who had not yet heard of the middlings purifier (development began the following year, in Minneapolis).

In 1871 Chicago added a second Hard Spring wheat grade and re-introduced a minimum bushel weight of 56 pounds for the No. 2 Spring and No. 2 Hard Spring wheat grades. This probably occurred in recognition of the value of Hard Spring wheat in the new milling system.

By 1875 the Hard Spring grades were re-named Northwestern Spring wheat No. 1 and No. 2, and were to "...include the varieties of Hard Spring Wheat of good milling quality and equal in every respect to the present standard of Nos. 1 and 2 Spring Wheat."[4] Minimum bushel weight was no longer specified for the No. 2 grades, but was lowered for No. 3 Spring wheat from 54 to 53 pounds. In 1877 there was a reversion to the use of No. 1 and No. 2 Hard Spring wheat as grade names, but the proviso against grading Black Sea and Flinty Pfife wheat higher than No. 2 still remained. And then in 1884 a grade of No. 4 Spring wheat was added without a bushel weight minimum being specified.

Any grading system will describe the quality of most of the product being graded (otherwise the system is of little value). But even for a series of grades, with quality parameters for each, there will be occasions when some product, some time, does not fit within the system. This gave rise to notations being made on the inspection certificates, such as "Rejected," "No Grade," or "Condemned." Wheat that did not fall within the system of grades was then at the mercy of the sample market for its eventual disposal, and was bought by merchants operating "hospital" facilities where it was cleaned, dried, treated with lime or sulphur, scoured to clean out smut, or simply mixed off with enough sound grain so that it became acceptable for some commercial application.

The Chicago Board of Trade also operated a grain market. Prices for the different grades of wheat were established daily through bids, and samples representing the grades for any one crop year were available for examination. Samples of the grade "standards" also could be purchased, for dispatch to prospective customers. The market quite quickly responded to normal physical differences between the quality of the three grades of wheat, so that certain price differentials became "normal." In the early years these were 10 cents between No. 1 and No. 2, and from 10 to 20 cents between No. 2 and No. 3 (depending on the year and the quantities available). Wide acceptance of this system of trading led rapidly to "contract grades" being established so that, if wheat delivered against a contract based on grade proved to be other than the specified quality, a predetermined discount came into effect. To retain its credibility and acceptance by buyers, the system depended on reasonably consistent delivery of the quality expected with a minimum of surprises, with variations limited to the grade options outlined in the contract. That the system is still in use today indicates that it worked not only to the general satisfaction of the buyer, but also greatly facilitated the bulk movement of grain from primary markets such as Chicago to processors (e.g. flour mills) in distant cities such as New York or Liverpool.

In the 1880s and 1890s the grading system was not thought of as being applicable to the purchase of grain in less than carlot quantities from producers. That was still considered to be an intimate transaction between buyer and seller in the presence of the product. Both buyer and seller were, of course, influenced by prices in the primary market place, with the buyer still leaving himself leeway to negotiate as the grain moved forward to the point where it would be graded and priced.

Nowhere in the system was there any idea of compulsory grading of grain. Grain arriving in carlots at the Chicago market could be inspected on payment of a fee. Grain leaving the Chicago market could also be inspected for a fee. Thus, although the grading system facilitated transactions both ways, its use was still optional.

References:

1. Annual report, Chicago Board of Trade, 1858, p. 11
2. Annual report, Chicago Board of Trade, 1858, p. 15
3. Annual report, Chicago Board of Trade, 1869, p. 17
4. Annual report, Chicago Board of Trade, 1875, p. 57

CHAPTER 4

ORIGINS OF THE CANADIAN GRADING SYSTEM

Wheat production in Ontario increased from 3.2 million to 40.9 million bushels annually from 1842 to 1882, while during the same period it decreased in Quebec. Most of the increase in Ontario was in winter wheat rather than the spring wheat which was traditionally grown in Quebec, and was due to several factors: the advancing frontier, a considerable inflow of immigrants to work the land and become producers, high prices, and good markets. The Crimean War of 1853 to 1856 improved markets and prices in the U.K., and with Reciprocity between Canada and the U.S. from 1854 to 1866 there was a considerable increase in the two-way flow of wheat and flour across the U.S.-Canadian border. During the American Civil War of 1861 to 65 a good deal of the two-way traffic in wheat would have been based on the grades then traded on the Chicago Board of Trade. The wheats grown on either side of the border were much the same, but the economically stronger U.S. merchants usually called the tune.

In 1863, however, the Province of Canada enacted legislation[1] for grain grading and inspection, with the grades being defined very much along the lines established by the Chicago Board of Trade. This legislation allowed Boards of Trade to establish Boards of Examiners who would recommend the appointment of inspectors, approve standard samples, and arbitrate disputes. The grades of wheat were defined as:

> No. 1 White Winter - Shall be sound, plump and free from admixture of other grain.
> No. 2 White Winter - Shall be sound and good but less free from other Grain than No. 1.
> No. 1 Red Winter - Shall be sound, plump and free from admixture of other grain.
> No. 2 Red Winter - Shall be sound and good but less free from other grain than No. 1.
> Extra Spring - Shall be sound, plump and free from admixture of other grain, and weigh not less than 61 lbs per Winchester bushel, and shall consist of two grades - No. 1 bright and No. 1.
> No. 2 Spring - Shall be sound, but less free from other grain than No. 1 and its weight shall be not less than 57 lbs per Winchester bushel. All unsound, damp, or very dirty wheat of whatever kind, shall be classed as Rejected.
>
> Wheat or other grain, shall be measured as follows for ascertaining whether it is of standard weight, ...that is to say: the bushel, half-bushel or quarter of a bushel, shall be placed on a flat floor, and filled with a scoop large enough to fill it at one time, and shall be struck with a roller 2 1/2 inches in diameter. Each Inspector of grain shall, at his own expense, provide sufficient samples of each of the qualities of the different kinds of grain, of which the standard is hereinbefore fixed; such samples to

> be approved by the Board of Examiners, and to be renewed as often as may be required by the said Board: and the same shall be deposited with the Secretary of the Board of Trade, and kept by him as standard samples, by which the Inspectors shall be governed in establishing the several qualities of wheat and other grain. The standard weight of each kind of grain shall be fixed and unchangeable; and when the samples aforesaid are renewed, the color of the new samples shall be as near that of the original samples as possible.

The Board of Examiners were to act as arbitrators in case an inspector's judgement was disputed.

Every year between April 10 and April 25 the Boards of Trade in Quebec, Montreal, Toronto, Kingston, Hamilton and London were each to appoint a Board of Examiners of "five skilful persons," who would examine applicants for the office of Inspector or Assistant Inspector of grain for the year commencing May 1. The inspector for grain for each city was to be appointed by the Council of the Board of Trade. Assistant inspectors were to be appointed by the inspector, who was to pay them. The tariff of inspection fees and services was to be established by the Board of Examiners from time to time. Inspection, however, was not compulsory.

Salient features of this legislation were: The grades were only vaguely defined (the winter wheat grades did not even specify bushel weight).

2. The standards which would govern the grading were to be provided by the inspector at his own expense, and presumably would be different for each inspector and the area within his jurisdiction. (They would also reflect local harvest conditions.)
3. The bushel weight standard, where mentioned, was the Winchester bushel, current in the U.S., not the Imperial bushel of the U.K.
4. The intent was clearly to provide a service to grain merchants and not to grade producers' wagon loads as they were delivered to country warehouses.

Despite the fact that both the grades and the system of inspection were borrowed in their entirety from the Chicago Board of Trade, this legislation had one entirely novel feature: it defined the grades and the inspection system for the province as a whole, whereas in the United States each city defined its own grades through a Board of Trade or a Chamber of Commerce. (Grading and inspection of grain did not become a state function in Illinois until 1871, with the establishment of the Illinois Railroad and Warehouse Commission. Other states gradually assumed this responsibility: Minnesota in 1885, Missouri in 1889, and Wisconsin in 1905.) Yet although the statutory grade definitions were established for the whole Province of Canada in 1863, the standard samples and the inspection itself were still very much regional matters and varied widely from town to town.

With Confederation, in 1867, this legislation theoretically covered the wider area of the new Dominion. However, to tidy up the legislation, in 1873 parliament passed "...an Act to amend and consolidate, and to extend to the whole Dominion of Canada, the laws respecting the Inspection of certain staple articles of Canadian produce."[2] Amongst other staple commodities, the legislation covered wheat and other grains. There were a number of modifications to suit the new circumstances; principally, the Governor in Council would designate at which cities or other places it was expedient to appoint inspectors, and would make such appointments on the advice of Boards of Examiners composed of three skilful persons (not five, as formerly) named by each of the designated Boards of Trade or Chambers of Commerce. Ottawa, St. John, and Halifax were officially added to the list of designated cities. Other provisions were much the same as in the preceding Act. The wording of the grade definitions for wheat was changed somewhat and expanded, and the overall provisions were more detailed, as shown below.

WINTER WHEAT

No. 1 White Winter Wheat shall be pure White Winter Wheat, sound, plump and well cleaned.

No. 2 White Winter Wheat shall be pure White Winter Wheat, sound, and reasonably clean.

No. 1 Red Winter Wheat shall be Red or Red and White mixed, sound, plump and well cleaned.

No. 2 Red Winter Wheat shall be pure Winter Wheat, Red or Red and White mixed, sound and reasonably clean.

No. 3 Winter Wheat shall include Winter Wheat not clean and plump enough for No. 2 and weighing not less than fifty-five pounds to the measured Winchester bushel.

Rejected Winter Wheat shall include Winter Wheat damp, musty, or from any cause so badly damaged as to render it unfit for No. 3.

SPRING WHEAT

No. 1 Spring Wheat shall be plump and well cleaned.

No. 2 Spring Wheat shall be sound, reasonably clean, and weighing not less than fifty-six pounds to the measured Winchester bushel.

No. 3 Spring Wheat shall be reasonably clean, not good enough for No. 2, weighing not less than fifty-four pounds to the measured Winchester bushel.

All Spring Wheat damp, musty, grown, badly bleached or from any other cause unfit for No. 3 shall be graded as Rejected.

A mixture of Spring and Winter Wheat shall be called Spring Wheat and graded according to the quality thereof.

Black Sea and Flinty Fife Wheat shall in no case be inspected as higher than No. 2.

Again, as occurred previously with the provincial legislation of 1863, these grades definitions and the three accompanying provisos were borrowed word for word from the U.S. (in this case from the wheat grades defined by the Illinois statute of 1871).

They were carelessly copied, however, since the phrase "pure Winter Wheat" was omitted from No. 1 Red Winter, but not from No. 2 Red Winter.

It's interesting to note that at this particular moment in history Ontario was growing about 20 million bushels of winter wheat annually, Quebec about 2 million bushels, and the new province of Manitoba less than a million bushels. The milling industry was big in Montreal and in southern Ontario, but was still using stones and no purifiers; out in Manitoba the milling industry was just getting started.

The exercise of 1873 was repeated almost exactly one year later[3], when a couple of minor changes were made to the general text (one allowing for appointment of arbitrators in case of differences between inspectors). The major reason for re-issuing the act was to change over from the Winchester bushel to the Imperial bushel in the grade specifications for the various grains. Thus for No. 2 Spring wheat it now read: "...weighing not less than fifty-eight pounds to the measured Imperial bushel;" and for No. 3 Spring Wheat: "...weighing not less than fifty-five and a half pounds to the measured Imperial bushel." The error of omitting the phrase "pure Winter Wheat" perpetrated in 1873 was continued in the 1874 legislation.

The rates for inspection of grain were also changed. In the previous legislation rates were quoted per car or per thousand bushels. Now they were: "...for inspecting grain in bulk per cental, one sixth of one cent... For inspecting grain in sacks per cental, one third of a cent." This change resulted in a fee of $37.33 being charged for inspecting one thousand tons of bulk wheat in a canal vessel, compared with $18.35 for the same quantity of grain the previous year.

The grades of wheat defined in the Acts of 1873 and 1874 were obviously designed to fit the needs of the ultimate buyer, the miller. Bushel weights for the most commonly used grades (those for White Winter wheat) were not spelled out in the acts as they would vary from year to year, depending on the crop, and would be established by the standard sample. The preference of the millers for White Winter wheat was shown by the insistence that the top grades be "pure White Winter Wheat" (for the Red Winter grades it could be Red or Red and White mixed), and the qualification that "...A mixture of Spring and Winter Wheat shall be called Spring Wheat and graded accordingly to the quality thereof." The millers'abhorence of hard, flinty spring wheats was indicated by the provision that "...Black Sea and Flinty Fife Wheat shall, in no case, be inspected higher than No. 2."

Although these grades were established primarily for marketing bulk wheat in quantity, doubtless the grades were known to the grain buyers operating from the flat warehouses at the country points and so helped to determine the price the farmer received. These local buyers had no standard samples available, however, so farmers could not prove the quality of their wheat if they felt they were being done an injustice. At this time no thought had been given to applying the grading system directly to the evaluation and pricing of a farmer's wheat at country receiving points. Only if a producer had enough wheat to fill a boxcar could he expect to move it to a primary market, have it graded and expect to receive the established price for it.

It seems unlikely that the grades legislated in 1874 had much impact on wheat grown west of Port Arthur (now Thunder Bay). By 1878 the annual wheat crop in Manitoba was estimated at 1,100,000 bushels. Winnipeg then had a milling capacity of 400 barrels per day, which could account for half the total wheat crop. By 1879 it was known that some quantities were being moved south on the newly opened Pembina Branch of the C.P.R., which connected with the St. Paul, Minnesota and Manitoba Railway; and by 1880, according to MacGibbon[4], the entire surplus was purchased by American buyers at prices higher than those for Dakota wheat. If this wheat was marketed on the basis of grades, the grades used almost certainly were those in use in Minnesota at the time.

Although it seems clear that grades were established originally to facilitate the movement of grain in bulk, there is some indication that producers must have been involved in setting the first grades in the Act of 1863. The presence of the Extra Spring wheat grade, which was required to be 61 pounds to the Winchester bushel (i.e. 63 pounds to the Imperial bushel) was probably included at the producers' insistence. (The definition of this grade was identical to a similar Milwaukee grade in use at the time except for a one pound higher bushel weight.) Producers would know that from time to time they might harvest small quantities of such high quality wheat and, remembering the discrimination that was practiced against spring wheats, they would be anxious to obtain a higher price for a premium product.

However, this grade disappeared in the revisions of 1873/1874, the grades became No. 1, No. 2 and No. 3 (rather than Extra, No. 1, and No. 2), and the bushel weight requirements were considerably reduced. These changes probably reflected ten years' experience of bulk handling, during which it was found that special premium grades were not practical because insufficient quantities were generated for efficient marketing. This consideration recurs often in our study of the Canadian system: the producers' interest in promoting premium grades which would maximize their return, offset by the handling system's inability to segregate and move small quantities economically.

When wheat moved in sacks from the farm to the ultimate user, theoretically it could be inspected and graded sack by sack. Some sacks might receive a premium grade while others would not, but the producer would feel he was maximizing his return. Similarly, the buyer would be able to market the premium grade wheat, provided his operation was on a reasonably small scale. But a new era dawned with the advent of bulk handling, the transport of wheat over long distances, and the development of "merchant mills" as opposed to "grist mills," resulting in continual adjustments being made to reflect the new conditions as the Canadian grading and handling system evolved.

By 1879 supplies of Red Fife wheat in Minnesota and the Dakotas were diminishing, as farmers tried out other, hopefully higher yielding and often softer, spring wheat varieties. The Minneapolis millers became concerned about this threat to the quality of their grists and proposed to offer a premium for Red Fife wheat, establishing a premium grade called No. 1 Hard which was required to be at least 75% Scotch Fife (the name by which Red Fife was known in Minnesota). This was the first real attempt to reward the producer for delivering quality wheat, rather than just meeting the needs of the primary market trade.

In 1884 the Canadian Government began to consider promulgating grades for Manitoba grown wheat. Its advisors were aware of the steps that had been taken in grading spring wheat in the U.S., so that when the Minister was asked in the House of Commons if Canada intended to set grades for Manitoba wheat which would be the same as those used in Minnesota and Dakota, he replied: "No, we are setting them higher because our wheat is better".[5]

In 1884 the Winnipeg Board of Trade named Captain William Clarke as inspector for the newly established Inspection District of Winnipeg. The appointment was not confirmed by the Federal government until 1885, by which time Captain Clarke was recuperating from a wound received at the battle of Fish Creek during the second Riel uprising. Clarke had come from Scotland, where he had had wide experience in the milling business, settling in Winnipeg in 1880. He was named to the Manitoba Board of Agriculture and was editor of a monthly magazine, The Nor-west Farmer. After being appointed inspector of grain, he became very active in promoting Red Fife wheat and in establishing grades for Manitoba's wheat. In the fall of 1884 he named his "Manitoba Standards for Grain," which were published in Manitoba Crop Bulletin No. 9 and specifically included two premium Hard Spring wheat grades which were required to be Red Fife containing not more than 10% of soft varieties[6], as shown below:

No. 1 Hard Spring Wheat shall be Red Fife Wheat containing no more than 10% admixture of soft varieties; must be sound, well cleaned and weigh not less than 60 lbs to the Imperial bushel.

No. 2 Hard Spring Wheat shall be Red Fife Wheat containing no more than 10% admixture of soft varieties; must be sound, reasonably clean and weigh not less than 58 lbs to the Imperial bushel.

No. 1 Spring Wheat shall be sound and well cleaned, weighing not less than 60 lbs to the Imperial bushel.

No. 2 Spring Wheat shall be sound and reasonably clean, weighing not less than 58 lbs to the Imperial bushel.

No. 3 Spring Wheat shall be fit for warehousing but not good enough for No. 2 and weighing not less than 56 lbs to the Imperial bushel.

Rejected Spring Wheat: shall be fit for warehousing but too low in weight or otherwise unfit for No. 3.

Damp Wheat is to be reported as No Grade.

Heating or heat damaged wheat to be graded Condemned.

Wheat containing any admixture of goose wheat to go 'rejected.'

Wheat containing smut or sprouted kernels in however slight degree shall in no case grade in its class as high as No. 1.

These grade definitions were the first recorded for wheat grown in Manitoba.

References:

1. 26 Vict. Cap. III (1863).
2. 36 Vict. Ch. 49 (1873).
3. 37 Vict. Ch. 45 (1874).
4. D. A. MacGibbon, The Grain Trade of Canada, Toronto: The MacMillan Co. of Canada, 1932, p. 26.
5. House of Commons Debates, April 23, 1885, p. 1308.
6. William Clarke, Manitoba Standards for Grain, Province of Manitoba, Crop Bulletin No. 9, October 31, 1884.

CHAPTER 5

THE SITUATION IN MINNESOTA AND MANITOBA, 1885

The year 1885 marks a significant point in this review. By then the Hard Spring wheat growing areas on both sides of the Canada-U.S. border had established their own grades and inspection systems aimed specifically at Hard Red Spring wheat as a premium product for the milling industry, both in North America and abroad.

In 1885 the Minnesota legislature passed "An act to regulate warehouses, inspection, weighing and handling of grain."[1] The act established a Railway and Warehouse Commission with responsibility to appoint a chief inspector, inspectors and weighmen, and to define and publish, by September 15th each year, the grades of all grains grown in the state. These were to be known as the "Minnesota Grades."

The Commission was composed of three commissioners and a secretary who, in their minutes for June 2, 1885, noted that in Minnesota there were seven grades above No. 3 for spring wheat; that is:

Extra No. 1, No. 1 Hard, No. 1 Northern, No. 1 Regular,
No. 2 Hard, No. 2 Northern, No. 2 Regular.

Minnesota grain merchants and buyers had adopted these grades from the "Milwaukee" grades, which were considered to reflect the values of Minnesota-grown wheats better than the "Chicago" grades. A major difference between the Milwaukee and Chicago grading systems was the consistent use of bushel weight minimums in the Milwaukee grades[2], which were defined as:

Extra No. 1 Spring	- 60 lbs to the bushel
No. 1 Hard Spring	- 58 lbs to the bushel; min. 50% Hard Wheat
No. 1 Spring	- 58 lbs to the bushel
No. 2 Spring	- 56 lbs to the bushel
No. 3 Spring	- 54 lbs to the bushel
No. 4 Spring	- 51 lbs to the bushel

As the Commission wanted to simplify the system in Minnesota, it reduced the number of higher grades by more than half and identified one premium grade for the special use of domestic millers. This was No. 1 Hard, and as defined and published in July of 1885, it was to be "...sound, bright and well cleaned, must contain not less than 75 per cent of Hard Scotch Fife (author's emphasis), and weigh not less than fifty-eight pounds to the measured bushel."[3] The minutes of the Commission indicate:

> It is believed that the grade of No. 1 Hard as established will be found to provide for the 'gilt-edge' wheat to the general satisfaction of the friends of that grade. It certainly represents the expressed views of a large majority of the producers of that grade as well as the millers who desire to give a special value to No. 1 Hard Scotch Fife Wheat.[4]

The next two grades were No. 1 Northern and No. 2 Northern. No. 1 was to be sound, well cleaned, contain not less than 50 per cent of the hard varieties of spring wheat, and have a minimum bushel weight of 57 pounds; No. 2 was to be sound, reasonably clean, and of good milling quality. The other grade designations were No. 3 Spring wheat, Rejected Spring wheat, and No Grade. The Commission commented:

> In establishing the grades of No. 1 and No. 2 Northern the Commission have adopted the word Northern to give character to, and designate as a trademark our Northern Wheat in the markets of the world, and thus draw a line between northern and southern Spring Wheat, as all know the superiority of northern grown wheat. It being true that Minnesota State grades are to apply to the crop grown in the most northerly portion of the United States, the designation of 'northern' should be so impressed upon our wheat as to carry with it into the markets of the East and to Europe all the advantage to which it is justly entitled.[5]

In Manitoba there had been agitation since the crop of 1882 to establish grades and an inspection system, which would ensure the development of markets for the growing quantities of Hard Spring wheat being grown in the province. The number of unofficial grades then in use was quite large (probably the same as those used in Minnesota), and there seemed to be a general dislike of the "Northern" grades. At a farmers' meeting in March 1885, reported in the Manitoba Free Press, producers passed a resolution to abolish the Northern grades as being superfluous.[6] The Winnipeg Board of Trade, in a letter to the Manitoba Board of Agriculture on March 26, 1885, remarked:

> The adoption of Northern grades our board has always opposed, but while they are in use in Duluth and Minneapolis the Dominion Department of Internal Revenue seems determined upon enforcing them here.[7]

Thus there appeared to be a feeling amongst both the producers and the trade that there should be fewer grades.

When the Acting Inspector for Manitoba, Mr. W. Clarke, outlined his Manitoba grades in the fall of 1884, he set grades for No. 1 and 2 Hard Spring wheat to be 90% Red Fife, and for No. 1 and No. 2 Spring wheat, but did not include the Northern grades. In a paper read to the Manitoba Board of Agriculture in February, 1885, Clarke pointed out that Manitoba was entering late into the competition for the British and European markets for hard wheats (in 1885 Minnesota produced 45 million bushels, North Dakota 26 million bushels, and Manitoba 7 million bushels). For this reason he pointed out: "...The demand exists only for the best qualities, consequently if we wish to establish a demand for Manitoba wheat we must begin with the best grades."[8]

References:

1. General Laws of Minnesota for 1885, Chapter 144, P. 136.
2. Northwestern Miller, August 22, 1879.
3. Minneapolis Tribune, July 10, 1885.
4. Minnesota State Archives, Public Service Commission 60. G. 1. 38.
5. Minnesota State Archives, Public Service Commission 60. G. 1. 38.
6. Manitoba Free Press, March 5, 1885.

7. The Nor'-West Farmer and Manitoba Miller, May 1885, p. 75.
8. The Nor'-West Farmer and Manitoba Miller, March 1885, p. 31.

PART 2

THE FIRST PERIOD IN WESTERN CANADA: 1885-1935

CHAPTER 6

THE GENERAL INSPECTION ACT, 1885-1886

The General Inspection Act of 1874, and amendments to it which established the grades for wheat grown in Manitoba and the Northwest Territories, was given royal assent on July 20, 1885.[1] Only three grades of spring wheat were established in the original (1874) Act, but 14 were established in the amendments. And, although wheat production in Manitoba and the N.W.T. was only a quarter of that in Eastern Canada, the spring wheat grades were listed first.

Six of the 14 grades applied only to wheat grown in Manitoba and the North West Territories of Canada, and required that the wheat be predominantly Red Fife. These were considered "premium" grades, to encourage the production of Red Fife wheat. Two other new grades, also considered to be "premium," required 85 percent hard spring wheat, although this did not have to be Red Fife variety nor be produced in Manitoba or the N.W.T. There were also the three spring wheat grades, essentially those established in 1874, and three grades for "goose wheat," the presence of which, in admixture with other wheat, precluded it from regular inspection. (Goose wheat was later termed Amber Durum wheat.)

Eastern producers also received some concessions in the list of winter wheat grades. There were now eight grades in place of the previous five, with a "premium" grade of Extra White Winter wheat having a minimum weight of 62 pounds to the Imperial bushel, and two grades of Mixed Wheat to accommodate mixtures of Red and White Winter wheat. The two Red Winter grades were once again limited only to Red Winter wheat.

It seems that every known interest group was consulted before the amendment was incorporated, so that the Act would cover every possible situation. There was now provision for at least 56 grades, since provision was also made for "No Grade," "Rejected," and "Condemned" categories.

The spring wheat grades were defined as follows:

> Extra Manitoba Hard Wheat shall be sound and well cleaned weighing not less than sixty-two pounds to the bushel and shall be composed of red Fife Wheat grown in Manitoba or the North-West Territories of Canada.
>
> No. 1 Manitoba Hard Wheat shall be sound and well cleaned weighing not less than sixty pounds to the bushel and shall be composed of at least eighty-five percent of red Fife Wheat grown in Manitoba or the North-West Territories of Canada.
>
> No. 2 Manitoba Hard Wheat shall be sound and reasonably clean weighing not less than fifty-eight pounds to the bushel and shall be composed of at least eighty-five percent of red Fife Wheat grown in Manitoba or the North-West Territories of Canada.
>
> No. 1 Northern Spring Wheat shall be sound and well cleaned weighing not less than sixty pounds to the bushel and shall be composed of at least fifty percent of red Fife Wheat grown in Manitoba or the North-West

Territories of Canada.

No. 2 Northern Spring Wheat shall be sound and reasonably clean weighing not less than fifty-eight pounds to the bushel and shall be composed of at least fifty percent of Red Fife Wheat grown in Manitoba and the North-West Territories of Canada.

No. 3 Northern Spring Wheat shall comprise all wheat of the above mentioned varieties, fit for warehousing and weighing not less than fifty-six pounds to the bushel, not good enough to be graded as No. 2.

No. 1 Canada Hard Wheat shall be sound and well cleaned, weighing not less than sixty pounds to the bushel and shall be composed of at least eighty-five percent of hard wheat.

No. 2 Canada Hard Wheat shall be sound and reasonably clean weighing not less than fifty-eight pounds to the bushel and shall be composed of at least eighty-five percent of hard wheat.

No. 1 Spring Wheat shall be sound and well cleaned, weighing not less than sixty pounds to the bushel.

No. 2 Spring Wheat shall be sound and reasonably clean, weighing not less than fifty-eight pounds to the bushel.

No. 3 Spring Wheat shall comprise all wheat fit for warehousing, not good enough to be graded as No. 2, weighing not less than fifty-six pounds to the bushel.

No. 1 Goose Wheat shall be plump and well cleaned weighing not less than sixty-one pounds to the bushel.

No. 2 Goose Wheat shall be plump and reasonably well cleaned, weighing not less than fifty-nine pounds to the bushel.

No. 3 Goose Wheat shall comprise such as is not good enough to be graded as No. 2, reasonably clean and weighing not less than fifty-five pounds to the bushel.

All good wheat that is slightly damp shall be reported and entered on the inspector's books as "no grade" with the inspector's notations as to quality and condition:

All wheat that is in a heated condition or too damp to be considered safe for warehousing or that has any considerable admixture of foreign grain or seeds, or is badly bin-burnt, whatever grade it might otherwise be, shall be reported and entered in the inspector's books as "Condemned" with the inspector's notations as to quality and condition;

Any material admixture of "rice wheat", otherwise known as "goose" or "California" wheat, or red chaff wheat with other descriptions of wheat, shall exclude the parcel from regular inspection;[2]

All wheat shall be weighed, and the weight per bushel entered in the inspection book.

In 1886 a consolidation of changes to the act of 1874 was passed, tidying up a few items but making no essential changes concerning wheat other than those of the 1885 amendments. This consolidation was now described as "The General Inspection Act".[3]

References:

1. 48-49 Vict. Ch. 66 (1885).
2. 48-49 Vict. Ch. 66 (1885).
3. 49 Vict. Ch. 99 (1886).

CHAPTER 7

THE FIRST FIFTEEN YEARS OF THE "MANITOBAS"

The grades established by the amendments to the General Inspection Act passed July 20, 1885 must have surprised most people in the West, and may also have had an impact on the Minnesota Board of Railroad and Warehouse Commissioners. For, instead of reducing the number of grades as had been done in Minnesota just ten days before, the amendments to the Canadian act greatly augmented the number of grades for spring wheat.

In general, two series of spring wheat grades had evolved at Milwaukee and Chicago since 1858, as the millers changed their demands from soft wheats to hard wheats. There were grades to accommodate hard vitreous spring wheat, such as No. 1 Hard Spring, and grades such as No. 1 Spring which accommodated all other types of spring wheat. Later, as Duluth and Minneapolis began to evolve grades for their own needs, the No. 1 Hard Spring designation was coupled with a minimum of 50% Scotch Fife wheat, the No. 1 Northern designation was introduced for mixtures of soft and hard wheat, and the No. 1 Regular designation was used for any other spring wheat.

The legislation of 1885 incorporated all these grades into the Canadian system. First there were the hard grades, called "Manitoba Hard" Extra, No. 1 and No. 2, which specified a minimum of 85% Red Fife wheat grown in Manitoba or the Northwest Territories of Canada. These were similar to the Minnesota grade No. 1 Hard Spring wheat, except they demanded more Red Fife content. Minnesota No. 1 Hard required 75% Red Fife and a minimum weight of 58 lbs per Winchester bushel, the Manitoba No. 1 Hard required a 10% higher percentage of Red Fife and had to be 60 lbs per Imperial bushel (equivalent to the 58-lb Winchester bushel). The standard for Manitoba Hard Extra was even higher, requiring 100% Red Fife and 62 lbs to the Imperial bushel.

The Northern type grades came next, for which the Canadian grades specified a minimum of 50% Red Fife. In comparison, the Minnesota No. 1 Northern merely called for 50% of hard varieties of spring wheat and the No. 2 Northern did not specify any minimum of hard varieties. The Canadian grade names for Northern wheat were, however, identical to those used in Minnesota. The next group comprised two grades, Canada Hard wheat No. 1 and No. 2, both of which specified 85% hard wheat but not its variety or its origin. Finally, there were three grades of spring wheat which corresponded to the "Regular" grades earlier current in Minnesota. These were essentially the same as the spring wheat grades in the 1874 version of the General Inspection Act, except they now include bushel weight minimums (which were identical to the Milwaukee grades).

The new grades covered the immediate past, the present as represented by Minnesota, and what could be foreseen of the future. They took account of the possible needs of the millers, the exporters, and the producers. And they were designed to meet the needs of the middle men of Eastern Canada who might wish to do some mixing as Western Canada's wheat moved east to markets in Ontario, Quebec, the Maritimes, the U.K., and Europe. Yet it's unclear why so many grades of spring wheat were established to meet the grading needs of an area then growing only 7 million bushels of wheat annually, when for the previous 20 years three grades had sufficed for the grading needs of Ontario, Quebec, and the Maritimes.

Apparently the federal government did not realize that it was creating the basis for a new staple industry that would enable Canada to consolidate its position as a viable economic unit in North America. For example, no provision had been made in the National Policy for developing an extensive grain gathering system for the West; it was the Government of Manitoba and the local municipalities who had to provide the incentives to build branch railway lines which would allow the marketing of that 7 million bushels. But on the other hand the inclusion of the Northern grades, which were opposed by the Farmers' Union and the Board of Trade alike, seems to indicate that the Minister of Internal Revenue wanted to cash in on the recognition currently accorded by the U.K. and Europe to Minnesota and Dakota spring wheat.

At this time the crop bulletin published by the Manitoba government indicated that about 80% of producers were seeding Red Fife wheat in response to the strenuous urgings of the Manitoba Board of Agriculture and the local mills and wheat buyers. John Ogilvie, who had established a large roller mill in Winnipeg in 1882 "...saw the quality of Western Canadian wheat as the decisive factor in Canadian nationhood,"[1] and then backed his conviction with his money by building the first line of country elevators. And it was William C. Van Horne, the new general manager of the C.P.R. who, benefitting from his previous wheat transport experience in Minnesota, recognized that export of wheat from Western Canada would make the railroad profitable. He also knew that the wheat would have to be of the highest quality if it was to sustain the costs of transportation to markets in Europe.

The "eastern interests" were represented in the west almost entirely by the Ogilvies and the C.P.R. Both were interested in the development of the West as a staple wheat producing and exporting area and their interests corresponded largely with those of the producers and the business community of Manitoba. They could have been served by a simple grading system similar to that promulgated unofficially in the fall of 1884, by William Clarke, the Acting Inspector at Winnipeg, with two premium grades and three regular grades. However, the General Inspection Act of 1885 apparently included the Northern grades and the Canada Hard grades to satisfy the whims of various eastern or "national" interests, real or imaginary. The Northern grades, with their requirement of 50% Red Fife wheat grown in Manitoba or the Northwest Territories of Canada, could be readily adulterated with lower quality eastern wheat on their passage through Eastern Canada and still be marketed under the name that had already established a great reputation for Minnesota and Dakota wheat in Eastern and European markets. The Canada Hard grades presumably were aimed at wheat producers in Ontario to give them a vehicle with which to develop wheat production along the lines required by the new milling process.

This was milestone legislation for a crop of some 36 million bushels. (The Manitoba crop for 1884 was just over 6 million bushels and the Ontario crop was 30.6 million). In the fiscal year ending June 1885 there were three grain inspectors in Canada, one at

Toronto, one at Montreal and one listed as operating in the district of Ontario and Durham (Port Hope). In that year 686,570 bushels of winter wheat and 509,712 bushels of spring wheat were inspected at these centres. As inspection was on request it was apparent that Eastern Canada, at least, did not feel there was a need for inspection of its wheat crop. In 1886 an inspector and a deputy inspector were established in Winnipeg, and two more centres in Eastern Canada also appointed inspectors. That year 2,610,850 bushels of spring wheat (most of it from Manitoba) and 720,800 bushels of winter wheat (all from Ontario) were inspected.

Increased Inspection of Western Wheat

By 1887 there were seven inspectors in Eastern Canada (of whom two were at Montreal), one at Port Arthur, and two at Winnipeg. The spring wheat crop in Manitoba was estimated at almost 6 million bushels, with spring wheat inspected that year totalling 4.83 million bushels; just over 1 million bushels of winter wheat also were inspected. The following year (1888) Manitoba's wheat crop doubled to 12.4 million bushels and spring wheat inspected almost tripled at 13.5 million bushels. Of this, 10.1 million bushels were inspected at Winnipeg or Port Arthur, which was as much as could be expected from a crop of 12.4 million when one considers the needs for seed and local flour mills. The remaining spring wheat was almost entirely inspected at Montreal (some 3.2 million bushels), which must have represented a quantity of eastern wheat which was blended into the Manitoba grades for export.

Significantly, after three crop years under the new grades and with a greatly augmented group of inspectors, particularly in Eastern Canada, it was almost entirely the Western wheat crop that was being inspected and graded, much of it on its journey to Eastern Canada. The Ontario wheat crop, still three to four times the size of the Manitoba crop, continued to go largely ungraded into eastern consumption.

The Non-Statutory Grades

The statutory grades defined by act of parliament did not totally represent the grading system. In some years most of the wheat would enter the statutory grades, but in years of severe frost, bad harvest weather, stem rust epidemics, etc, very little of it might. For grain which did not make the statutory grades, other grades were created and defined by a Standards Committee established by the General Inspection Act (amended) of 1885. This Committee was made up of one to three members drawn from each of the Board of Examiners selecting wheat and grain inspectors for the cities of Quebec, Montreal, Toronto, Hamilton, London, Ottawa, Winnipeg, Halifax, St. John and Port Arthur. The Committee was to meet at Toronto at the call of the Council of the Toronto Board of Trade, "...between the fifteenth day of August and the first day of October for the purpose of choosing samples of grain of the various grades, to be the standards by which the inspectors of grain throughout Canada shall be governed in the work of inspection; and such standards shall be chosen and approved by the said examiners, or a majority of them present at such meeting..."[2].

When the delegates from Winnipeg were called to the first meeting of the Committee, held in Toronto in September, it was much too early to take representative samples of wheat with them because most of the 1885 western wheat crop had not yet been harvested. In addition, they found themselves strongly outvoted by the eastern representatives on matters affecting western wheat production. That crop year 2.6 million bushels were inspected, of which 1.9 million bushels from Manitoba were graded into three "Frosted" grades. These grades were created after the crop had been harvested to accommodate otherwise high quality wheat which was only frost damaged, and they had previously been used in Minnesota to cope with similar situations.

To prevent a recurrence of the unsatisfactory first meeting, the following year the Winnipeg Board of Trade urged maximum possible Western representation at the 1886 Standards Committee meeting and set up its own grain committee to agree on the make-up of the "standard" samples of western grain grades which would be presented. That year there was a frost in August and the Manitoba grain committee was forewarned of the renewed need for the "Frosted" grades, which were approved by the Standards Committee meeting at Toronto. However, the amount of wheat subsequently inspected into these grades proved to be much less than in the previous year. The major grade inspected from the crop of 1886 was No. 1 Manitoba Hard, of which there were 2.46 million bushels, representing one half of the total spring wheat inspected.

In 1887 the Winnipeg Board of Trade, on behalf of the Board of Grain Examiners, petitioned Ottawa to bring the standards more into line with those in Minnesota. The latter had been lowered in the fall of 1885[3], designating No. 1 Hard to be only 50% Scotch Fife and No. 1 Northern to be only "hard and soft varieties of spring wheat." These changes had been made by the Minnesota Railroad and Warehouse Commission, bowing to pressure to reinstate the grades that had been in effect at Duluth before the Commission was established. In its brief the Winnipeg Board of Trade noted that "...The price of wheat in this country is largely regulated by the price prevailing in Duluth..."[4] and indicated that they would like to see our standards the same as the U.S. standards. The Department of Internal Revenue in Ottawa agreed to the proposal, but as the Boards of Trade of Toronto and Montreal were not in favor the idea was shelved. The Winnipeg Board obviously felt that the east should not have the major voice in how to grade grain from the west.[5] The Board pointed out that of the seven million bushels in store at Duluth, 85 to 90% was graded No. 1 Hard while exports of wheat from Manitoba showed less than 20% of that grade, even though the Manitoba wheat was every bit as good as that from Duluth. They indicated that they wanted "...our Board to set grades for Manitoba wheat."[6]

Here we see one of the major differences emerging between the Canadian and U.S. systems: the Canadian system was established by Federal legislation and thus was influenced by "eastern interests," whereas the American system was a State responsibility and responded more readily to specific local interests.

The changes requested by the Board of Grain Examiners of the Winnipeg Board of Trade were relatively modest. They sought a reduction in the required percentages of Red Fife wheat in Extra Manitoba Hard and No. 1 and No. 2 Manitoba Hard. They also wanted a grade of Manitoba Hard White Fife wheat to be established, to accommodate the second most popular variety grown in Manitoba, which was claimed to mature a week earlier than Red Fife. The government at Ottawa responded by issuing an Order in Council on December 22, 1887, setting 85% Red Fife for Extra Manitoba Hard and 2/3 Red Fife for the No. 1 and No. 2 Manitoba Hard grades. It also established a grade of No. 1 Hard White Fife to be 3/4 Hard White Fife wheat. But the Boards of Trade of Toronto and Montreal protested immediately against implementation of these changes and the Federal Government, bowing to their demands, cancelled the Order-in-Council by issuing a new Order-in-Council on January 4, 1888. The strong influence of the "eastern interests" was made abundantly clear.

However, the Winnipeg Board of Trade, backed now by the newly (1887) established Winnipeg Grain and Produce Exchange, persevered in its demands until the Government issued a new Order-in-Council on August 8, 1888 containing some of the desired grade changes. A new grade of No. 1 Hard White Fife was established, which required 60% of White Fife instead of the 75% previously asked for, and a proviso was included that limited the content of soft wheat to 25%. The latter would doubtless encourage Ontario merchants to add Ontario soft white winter wheat up to this level. Four other changes also were made:

1. Grade No. 3 Northern was eliminated, leaving No. 3 Spring as the residual grade below No. 2 Manitoba Hard and No. 2 Manitoba Northern.

2. The northern grades were renamed Manitoba Northern.

3. The Canada Hard grades No. 1 and No. 2 were eliminated. The only use made of these grades had been for 4667 bushels inspected at Toronto in 1887/8 and 307,800 bushels inspected at Winnipeg in 1888/9.

4. The adjective "hard" was inserted to qualify "red Fife Wheat" each place where it appeared in the grades.

This last change was presumably made at the request of the Winnipeg Board of Trade and had an important and long-lasting influence on the grade structure. In effect it added a "vitreous" minimum to each of the Manitoba grades, although it was not spelled out as such until 1925, which in the intervening years caused interpretation problems. Eventually the Royal Commission on the Grain Trade of Canada recommended in its report in 1908 that the term Hard Red Fife be defined in the Act as "wheat that is red in colour and of the Red Fife variety"[7] and this was done in the consolidation of the Act in September 1910. Since sound, vitreous Red Fife wheat was red, but sound, piebald (i.e. starchy) Red Fife wheat was orangyyellow, this definition served to limit the Manitoba grades to a minimum of 50% vitreous Red Fife wheat in the Northerns and 67% in the Hards.

It is interesting to speculate on the implications of the grade definitions for the six grades established for wheat then being grown in Manitoba and the North-West Territories. The wording is the same in the legislation of 1885, 1886 and 1888; typically:

> No. 2 Manitoba Northern wheat shall be sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than fifty-eight pounds to the bushel and shall be composed of at least fifty percent of hard red Fife Wheat, grown in Manitoba or the North West Territories of Canada.[8]

This grade, when applied by the Winnipeg or Port Arthur Inspection Districts, would be composed of 100% wheat grown in Manitoba or the North-West Territories. But the same grade, if applied in the Montreal or Toronto Inspection Districts, could contain up to 50% admixture of eastern-grown spring wheat. In the crop year 1887-88, 712,000 bushels were inspected in Montreal into the Western wheat grades. One can only conjecture whether the standards for the "Western grades" set by the annual meeting of Grain Examiners in Toronto took this possible adulteration into account.

When, in 1888, the Grain Committee of the Winnipeg Board of Trade selected samples of that year's western wheat crop to take to Toronto as grade standards, for some unknown reason the meeting of Grain Examiners in Toronto refused to accept them. Under the provisions of the General Inspection Act, the responsibility for setting standards then fell to the Minister of Internal Revenue. He appointed a special committee consisting of four members of the Winnipeg Grain Examiners together with David Horne, the inspector at Winnipeg, and Frank Gibbs, the inspector at Port Arthur. They met on October 27, 1888 and selected standard samples which were used by all inspectors in the Dominion.

The conflict between the interests of the grain merchants and flour millers in Eastern Canada and those in Western Canada was rapidly coming into the open. Merchants in Eastern Canada blatantly considered the quality of Western Canadian wheat something to be tampered with to their financial advantage, and conceivably the conflict could even occur within a company. For example, A. W. Ogilvie & Co. were wheat buyers in Winnipeg who were supplying Ogilvie's eastern mills. John Ogilvie was running the large Ogilvie mill in Winnipeg and also was one of the five members of the Board of Grain Examiners of the Winnipeg Board of Trade. Undoubtedly he had heated arguments with his eastern peers, but fortunately he was a very staunch supporter of the Western interests and "...saw the quality of Western Canadian Wheat as the decisive factor in Canadian nationhood."[9]

At this time there was nothing compulsory about the grading of wheat. The C.P.R. required Winnipeg inspection of all carlots of wheat which were to be forwarded "all rail" to Eastern Canada (generally during the winter when the lakes were frozen over), and these were the bulk of Winnipeg inspections. When the lakes were open some wheat was inspected at Port Arthur, substantial quantities were inspected at Montreal by inspectors appointed by the Montreal Board of Trade, and lesser amounts were inspected at Toronto. Yet, even though there were "standards" that supposedly governed inspection anywhere in the Dominion, for a number of years there were complaints from abroad about the quality of Manitoba wheat bearing a Montreal inspection certificate.

The Demand for a Western Standards Board for Western Grain

After 1888 the confrontation with the "eastern interests" intensified, with the Winnipeg Board of Trade and the Winnipeg Grain and Produce Exchange pressing for a Western Standards Board for Western grain. These organizations also were demanding official government weighing at all terminals, as was done in Minnesota. The C.P.R. in Montreal successfully vetoed government weighing, but the government in Ottawa yielded to the pressure for a Western Standards Board. Consequently, the General Inspection Act was amended on May 2, 1889[10] to provide for such a Board, which was to be appointed annually by the Governor in Council. Its members were to be selected from the Boards of Examiners and appointed inspectors of grain at Port Arthur or farther west. (The Port Arthur, Winnipeg, Portage la Prairie, Brandon, Regina, Moose Jaw, and Calgary Boards of Trade were eligible for representation.) It was to consist of no more than 11 persons who were to select standards for grain grown west of Port Arthur, which would govern the grading of Western grain throughout Canada. The annual meeting was to be held in Winnipeg.

By 1891 the wheat crop in Western Canada was estimated at just over 23 million bushels. The Board of Trade's annual report mentioned the opening of a steady market in Europe for Manitoba Wheat and remarked that "...the bulk of our low grade wheat now finds a market in Great Britain or the Continent."[11] That year the Western Standards Board, in addition to establishing the usual grades, set standards for the "commercial grades" of No. 1, 2 and 3 Regular wheat. (The term "Regular" had appeared in newspaper listings of wheat prices at Winnipeg since before 1885, and the term was also used at the Minneapolis and St. Paul markets. At Winnipeg in March 1885, No. 1 Regular was quoted at $0.52 per bushel, No. 1 Northern at $0.67, and No. 1 Hard at $0.72.*) The Regular designation seemed to represent a series of grades less valuable than the Northern grades and might simply have been a western name for the spring grades in the General Inspection Act. Regular grades were referred to in only two of the Minister of Internal Revenue's annual reports covering grain Inspection in Canada, for the crop years 1891 and 1892.

Legislation to Provide for Commercial Grades

The increased number of grades for which standards were set by the Western Standards Board was brought about by an amendment to the General Inspection Act dated August 28, 1891[12]. This amendment authorized the Board to set commercial grade standards where a significant portion of the crop fell outside the established grades. The grades were valid for only one crop year and were specifically intended to benefit the producer.

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*These three different No. 1 Grades were identical to those in use in Minnesota.

The increasing proliferation of grades of western wheat was, however, creating difficulties for American railroads which were moving Western Canadian grain through the U.S. to export ports. The problem occurred because the railroads would agree to accept only No. 1, 2 and 3 Hard wheat for transport and binning purposes. These were, of course, unofficial grades for the wheat, being used simply to facilitate handling and storage.

Proliferation of Grades

Considerable influence was being exerted on the grading and inspection system by the three elements of the grain industry: the producers, the grain trade (including the railways), and the overseas millers. And the problem was exacerbated as the number of grades increased.

Prior to 1858 grain markets recognized essentially only two grades of wheat: standard and rejected. If wheat was accepted as "standard," it moved forward to the mills or to shippers who forwarded it to other mills at greater distances from the market. If it was "rejected" it generally went at distress prices to a local merchant, who, through drying, cleaning, scouring, lime treatment and/or blending managed to render it salable in the local market. Chicago doubled the number of grades to four in 1858, to provide greater precision in defining the state of the wheat, and then in the 1870s the grades began to be hedged on the futures market. Subsequently, as the market expanded, so did the demand for an even greater degree of precision in defining the quality of the wheat.

Western Canada started quite late along this evolutionary path. All parties involved - the producers, the grain trade, and the governments - were anxious to gain a share for Canada of the rapidly expanding market for wheat in Europe. It was realized that, to gain a foothold, some innovation was required that would make Canadian wheat seem equal to or better in quality than that produced by the regions which had preceded Canada into the market. Accordingly, when the Canadian campaign was launched in 1885, in place of four grades of spring wheat, 14 grades were established plus a provision for any of the grades to be sub-classed as "No Grade," "Rejected," or "Condemned" (see Chapter 6). Then, from 1889, the Western Standards Board could set considerably more grades and, two years later, a revision to the General Inspection Act authorized Commercial grades, to be defined each year to accommodate variations in the crop created by environmental conditions.

Chicago had originally ignored the needs of the producer in developing its grading concepts, and Minnesota had not been anxious to change this pattern. Indeed, the first chief inspector under the Minnesota Railroad and Warehouse Commission in 1885 held that there could be no satisfactory system of grain inspection at primary elevators and that there was no need for one.[13] Manitoba, on the other hand, had already decided that an essential move to become firmly established in the European market was the promotion of Red Fife wheat. Therefore the grading system was geared to encourage producers to grow this wheat, and it was hoped that a system of unofficial inspections, to be carried out by the country elevator agents, would serve the producers reasonably well. A concession was also made to the demands of producers whose high quality wheat was being graded into the non-premium catchall grades of spring wheat, by establishing a White Fife grade in 1889.

An End to the Adulteration of Manitoba Grades in Eastern Canada

In 1895, by Order-in-Council of August 29, Ottawa made a concession to the west in the east/west battle for control of the wheat trade. The wording of the Manitoba grades was changed to preclude the possibility of their adulteration with eastern wheat. The definitions now read: "...shall consist wholly of wheat grown in Manitoba and the North-West Territories of Canada..."[14]. Six weeks later, by Order-in-Council of October 14, the Extra Manitoba Hard grade was dropped, and a proviso was added to the No. 1 Manitoba Hard grade that "...no wheat which has been subjected to scouring or brushing for the removal of smut or other fungoid growth, shall be included in this grade".[15] This same Order-in-Council also included a new section, Provisions as to all Grains, which stated:

> In the inspection of grain, inspectors are to be governed in their interpretation of the foregoing classification by the standard samples selected by the Board appointed for that purpose. If, however, they are called upon to grade any wheat, which, as to weight, is not equal to the weight of such standard samples, they are not, if they deem it otherwise equal to the standard sample, to reduce the grade provided the weight is equal to that required by the legal definition hereinbefore given.
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> Neither shall inspectors decline to grade any wheat other than No. 1 Manitoba Hard, because it differs in its constituent parts from the standard sample, provided it is, in respect of soundness, cleanliness and proportion of hard wheat therein, and its general milling qualities equal to the standard placed in their hands for their governance.
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> Nor shall the restrictions mentioned in grade one as to scoured or brushed wheat apply to any of the other grades fixed hereby.[16]

The change in the grade definitions reflects the increasing sensitivity of the government to the needs of the export market (almost entirely, at that time, the United Kingdom). The "Manitobas," as they were called in the U.K., were first quoted on the Liverpool market on November 9, 1892, and by then the U.K. was importing 9 million bushels a year from Canada. Complaints had been received about the quality of wheat arriving in the U.K. with an inspection certificate issued in Montreal or Toronto, and British buyers had voiced their preference for wheat bearing a "western" certificate. This is hardly surprising, because it was theoretically possible to receive a 50% admixture of Ontario spring wheat with Manitoba Red Fife, which still met the grade specification for No. 1 Manitoba Northern. Henceforth, under the 1895 legislation, the Manitoba grades were to be entirely of Western Canadian origin.

The Need for Closer Regulation of the Grain Trade

By 1895 Western voices began to predominate over the Eastern interests at Ottawa, as the potential of a great new staple trade based on Western Canadian wheat became apparent. No major changes to the grades were made during the next six years but, as the wheat-gathering system expanded to cope with the increasing volume of grain being grown, experience demonstrated the need for government regulation of the system.

Regulation had been attempted in Minnesota in 1885, with the establishment of the Minnesota Railroad and Warehouse Commission, but had not worked too successfully until further state legislation, passed in 1893, put some teeth into the earlier bill. Minnesota had started 25 years ahead of Manitoba and, although Manitoba was catching up fairly rapidly, there was this extra experience in development to draw upon. Communication was continuous and cordial between Winnipeg grain interests and those in Duluth and Minneapolis, so that the problems experienced in Minnesota provided a basis for "evasive action" which could be taken to avoid similar problems in Manitoba.

The Winnipeg Board of Trade and the Winnipeg Grain Exchange continually lobbied the Minister of Internal Revenue to make further changes to the General Inspection Act, and in 1896 recommended a Commission be formed to inquire into the grain inspection system. Although the government took no immediate action, it did establish a Royal Commission in October 1899 to investigate alleged evils in grain transportation and handling. This Commission, noting that there was no regulation of the grain business other than by the railways and the grain companies, recommended adopting the regulatory system established in Minnesota since 1885. The Minnesota legislation was copied to a considerable extent and its principles were adopted in the Manitoba Grain Act of 1900. In the meantime, however, the Minister of Internal Revenue had heard presentations from the eastern millers and western interests, and drew up revisions to the General Inspection Act which were approved by Parliament in August, 1899.[17]

References:

1. G. R. Stephens, Ogilvie in Canada: Pioneer Millers 1801-1951 (privately printed, 1951), p. 30.
2. 48-49 Vict. Ch. 66 (1885).
3. Minneapolis Tribune, September 11, 1885.
4. Annual report for 1887, Winnipeg Board of Trade, p. 12.
5. Annual report for 1887, Winnipeg Board of Trade, p. 28.
6. Annual report for 1887, Winnipeg Board of Trade, p. 28.

7. Report of the Royal Commission on the Grain Trade of Canada 1906, Ottawa, King's Printer 1908 p. 33.
8. 51-52 Vict. Ch. 45 (1889).
9. G.R. Stephens, p. 30.
10. 52 Vict. Ch. 16 (1889).
11. Annual Report for 1891, Winnipeg Board of Trade, p. 13.
12. 54-53 Vict. Ch. 48 (1891).
13. William Watts Folwell, A History of Minnesota, Vol II, Minnesota Historical Society, 1969, p. 209.
14. Order-in-Council, August 29, 1895.
15. Order-in-Council, October 14, 1895.
16. Order-in-Council, October 14, 1895.
17. 62-63 Vict. Ch. 25 (1899).

CHAPTER 8

THE LANDMARK LEGISLATION OF 1899

According to the Minister of Internal Revenue, the objective of the 1899 legislation was to reduce the year-to-year variability of the wheat grades. This was to be accomplished by removing the provision that grade changes could be made by Order-in-Council and making them the responsibility of Parliament.

There were minor changes to the grade definitions but major changes to the regulations set out in the "Schedule" applying to wheat grown west of Port Arthur. These were to become of enormous significance to the development of the grading and inspection system. Provision was made for the appointment of a Chief Inspector, and all inspectors in the Inspection District of Manitoba, which now included the whole area west of and including Port Arthur, became salaried government employees (previously they had been paid from inspection fees). And inward and outward inspection for the first time became compulsory for all wheat placed in public elevators or warehouses east of Winnipeg.

The Beginning of the Export Standard

The legislation also forbade the mixing of different grades in public elevators and the use of special bins for segregation of parcels which might be of especially high quality. This was a definitive move toward maintaining the "quality enhancement" that resulted from blending numerous parcels of the same grade. A further regulation stated that any wheat shipped from any terminal elevator would be inspected only at a lower grade if it showed evidence of being below the average quality of the grade in the bins of public elevators (where no mixing was allowed). This was the origin of what became known as the Export Standard, in the 1929 revision of the Canada Grain Act.

The Farmers' Right of Appeal

A landmark clause in the regulations gave farmers the right to proper grading and dockage assessment on their grain at the country elevator if they wished it. The Act provided that:

> 15. Whenever there shall arise a difference of opinion between any farmer selling wheat and any wheat buyer as to the grading of such wheat, the farmer while taking the price offered for his wheat as of lower grade than that to which, in his opinion, it belongs, may insist on a sample being selected and agreed on between buyer and seller, which sample shall be parcelled and sealed and sent to the Chief Inspector at Winnipeg, and the said Chief Inspector shall grade the said wheat without delay and make a return of his grading to both parties, and if the said Chief Inspector finds the said wheat to be of a higher grade than that on

> which the price had been already paid, then the said buyer shall pay to the farmer afore-said the difference between the price which he had already been paid and that which should have been paid in the first instance had the grade afterwards filed by the Chief Inspector been agreed upon at the time of sale.[1]

This rather wordy clause was proposed as an amendment to the Minister's draft bill in the House of Commons and it was turned down. It was reintroduced, however, when the bill went to the Senate and was not again disturbed before being signed into law by the Governor General. Eighty-three years later, this remains a cornerstone of the grading system as applied to farmers' deliveries to country elevators.

Manitoba Inspection of Western Wheat

Another concession to the west, which had been requested since 1885, was the provision that all wheat produced in Western Canada which passed through Winnipeg or Emerson en route east or south must be inspected at one of the two points. Such inspection was to be final (as, for example, between the western farmer or dealer and the Winnipeg dealer) and was to be the basis for binning at terminals. This ruling was of particular importance to producers loading their own cars at the loading platforms.

An interesting feature of the 1899 legislation was the singling out of wheat grown west of Port Arthur for control measures which were not deemed necessary for wheat grown east of Port Arthur. Apparently the "west" was considered to have entirely different concepts of grain handling, grading and inspection systems than those that evolved in the "east." This dichotomy still exists.

Equally interesting is that the "subject to grade and dockage" clause, which was slipped innocuously into the bill in the Senate, could not really be considered valid because there was no legal control over country elevators or their agents. Although the legislation was assented to on August 11, 1899, the Royal Commission which resulted in the drafting of the Manitoba Grain Act establishing such control was not appointed until October, 1899, and the Act of Parliament which established federal control over country elevators and the grain business generally was not assented to until July 7, 1900. In those days, apparently, the federal government could 'shoot first and ask questions after'!

Reference:

1. An Act to Amend the General Inspection Act, 62-63 Vict. Ch. 25 (1899).

CHAPTER 9

GRAIN HANDLING BECOMES UNIQUELY CANADIAN

The revisions to the General Inspection Act passed in 1899 established the scenario which determined the evolution of our grading and inspection system and made it uniquely Canadian. Previous legislation had mostly been borrowed from the U.S. But the direction and principle of the new legislation, while in part prompted by the Minnesota experience, were quite different from the approach taken in the U.S. A significant difference was that legislation was federal while in the U.S. it was empowered by the individual state legislatures. In Canada, the affected party (Western Canada) was represented in the House of Commons by a miniscule minority: in effect, "big brother" decided everything, for better or worse. In Minnesota, the millers and grain merchants managed to prevail over the interests of the farmers, to prevent the adoption of the types of control measures which were established in Canada. Thus, from 1899 the grading, inspection, and handling systems in Canada and the U.S. continued to evolve in different ways.

The Manitoba Grain Act of 1900[1] was promulgated to complement the changes in the General Inspection Act. It declared terminals, country elevators, and warehouses to be "public" and required that they be licensed. Owners of public elevators had to post substantial bonds and could be heavily fined for operating without a license. They could also have their license suspended for non conformance with the regulations laid out in the General Inspection Act. The Act required that a Warehouse Commissioner be appointed to supervise and oversee the operation. Official weighing was to be the responsibility of the Warehouse Commissioner, but the duties of the Chief Weighmaster and Chief Grain Inspector could be combined in one person appointed by the Governor in Council under the General Inspection Act.

The Manitoba Grain Act was modelled closely on the Minnesota "Act to Regulate Warehouses, Inspection, Weighing and Handling of Grain" of 1885,[2] although in Canada it applied to all terminals and country elevators in the Manitoba Inspection Division.

The Minnesota legislation was restricted to terminals at Duluth, St. Paul and Minneapolis, which promptly utilized a loophole in the bill and declared themselves to be private. The Warehouse Commission reported to the state legislature in 1892 that only two elevators had taken out licenses under the legislation, both in Minneapolis. The bill was later modified to make it applicable to all country elevators in Minnesota so that the control mechanism was eventually put in place, but it was never used in the way it was in Western Canada to ensure equitable treatment for the producer delivering his grain.

Within the short space of 17 years (1883 to 1900) a grading, inspection, and handling system for wheat in Western Canada was in place, the principles of which have remained basically unchanged to this day. Changes that have been made since 1900 have largely reflected the application of science and technology to seed production, field husbandry, grain handling, transportation, inspection, and grading. Almost all such modifications have been to simplify the system to increase its efficiency while maintaining the high quality of the product.

Legislation for Cleaning Grain

In a 1904 revision to the Grain Inspection Act, Section 87 provided that:

> In the case of uncleaned grain inspected in the Division (only applicable to the Manitoba Inspection Division) the inspection officer shall state in his certificate the percentage of dirt necessary to be cleaned out at terminals in order to clean the grain to the grade certified...[3]

This was the first move to deal with grain cleaning through legislation. From the outset grades had been based on cleanliness, and farmers had been lectured on how they could improve their grades through careful field husbandry practices and by cleaning their grain before marketing it. These measures, however, did not result in clean grain being delivered to the system, and so responsibility for providing cleaning facilities was transferred to the country elevators.

One of the requirements of the C.P.R. for the erection of one of its "standard elevators" was that grain cleaning equipment was to be installed. The Manitoba Grain Act of 1900 had specified:

> Sec. 38 It shall be the duty of the owner, lessee or manager of every elevator now or hereafter equipped with grain cleaners to clean the grain before it is weighed, when requested to do so.[4]

Again, however, this proved to be impracticable because grain had to be moved quickly through the elevators during the fall rush. Finally it became apparent that the terminals were the place where cleaning could be done, and so in 1908 a new paragraph was added to Section 126A of the Inspection and Sale of Grain Act, which provided:

> 5. All grain marked by the inspection department for cleaning shall be cleaned under the supervision of the inspection department or the inspecting officer and the inspector may condemn any cleaning machine which in his opinion is not doing satisfactory work and may order machines installed which will satisfactorily clean such grain to its proper grade; and he shall have the power, where he finds cleaning facilities inadequate, to order the installation of such additional machines as will meet the requirements.[5]

This was very strong stuff! Further, the Manitoba Grain Act amendment of 1908 provided:

> "Sec. 19.9 Every public terminal warehouseman, in the Manitoba Inspection Division, shall clean all grain received by him on which the Inspector has set dockage for cleaning, except all rejected grades which shall be cleaned only upon the request of the owner.[6]

Since 1900 it had been well known that dirty grain went out of condition much more readily than clean grain, and this was especially true if the moisture content was above 14% as it often was at harvest time in Western Canada. Furthermore, since the grade definitions called for clean grain, clean grain was needed for export from terminals. Hence, the flurry of legislation.

Rationalizing the Legislation

Until 1912 and the passage of the Canada Grain Act there was to be considerable confusion because of the shotgun approach of the legislators. The four pieces of legislation quoted above are from three different acts: the Grain Inspection Act, the Manitoba Grain Act, and the Inspection and Sale of Grain Act. Authority for administering these acts resided with two different federal departments, and the various acts contained duplications, contradictions and redundancies. Consequently a Royal Commission was appointed in 1906, which made a number of recommendations that were embodied in the two revisions of 1908 (quoted above) affecting cleaning and cleaning equipment.

The report of the 1906 Royal Commission was influential in bringing about a rationalization of the legislation affecting the grain handling system, which at the time was covered by five separate acts. This rationalization was first presented to parliament, by the Liberal government, as a Bill in February, 1911. It was extensively reviewed in committee but was not passed before an election later in the year returned a Conservative government. However, basically the same bill was presented by the new government and was passed early in 1912.

References:

1. 63-64 Vict. Ch. 39 (1900).
2. General Laws of Minnesota for 1885, Chapter 144.
3. 4 Edw. VII Ch. 15 (1904).
4. 63-64 Vict. Ch. 39 (1900).
5. 7 - 8 Edw. VII Ch. 36 (1908).
6. 7 - 8 Edw. VII Ch. 45 (1908).

CHAPTER 10

THE CANADA GRAIN ACT, 1912

The new act[1] established the Board of Grain Commissioners for Canada, with headquarters at Fort William. There were to be three Commissioners, the same number as had been set up by the state of Minnesota in 1885, and they were to be provided with railway passes by all Canadian railways so that they could keep in close contact with the Western wheat growing area. The act divided Canada into two grain growing and marketing areas: the Western Division, which included the Lakehead and everything west of it, and the Eastern Division, which covered everything east of the Lakehead. As had transpired in earlier Canadian legislation, the Canada Grain Act was almost entirely concerned with Western grain and its passage through Eastern Canada to consumption points or for export. The general provisions of the Act applied only to the Western Division, and this still holds true today.

The Canada Grain Act increased the number of Grain Commissioners from one to three and enlarged their responsibilities, but aside from tidying up the existing legislation and putting it all into one place under one federal department (the Department of Trade and Commerce), it did not introduce anything new. The grades of grain carried into the new act were the same as those established at the 1908 revision of the Inspection and Sale of Grain Act.[2]

The Proliferation of Off-Grades

During the 27 years from 1885 to 1912, the grading system for wheat grown in Western Canada appeared to have been considerably simplified. Fourteen statutory grades for western spring wheat were established in the 1885 legislation, but by 1912 there were only five grades. While this reduction represented a considerable simplification, the actual number of grades in use had grown enormously over the 27 years. C.B. Piper, in his Principles of the Grain Trade of Western Canada[3], estimated that in 1912 there were 360 grades for wheat. His estimate included grades for spring and winter wheat, rejected grades, condemned grades, "no grades," dried grades, the commercial grades set each year by the Standards Board, and many permutations and combinations.

There were two major reasons for the proliferation of "off grades," as they were called. The private terminals (the so called Hospital Elevators) bought much of the off-grade grain. They wanted to have it characterised as minutely as possible, partly to make the best possible use of it for blending purposes, and partly to buy it at the best price. Originally the producers had favored a small number of grades so that they could avoid being bamboozled by the buyers at the country elevators. But with the protection of the legislation of 1899, which guaranteed them proper grade and dockage assessment if they wanted it, the producers opted for large numbers of grades to take care of all the faults to which wheat might be prone. They also expected that prices would be maximized by having grades which specifically referred to quality.

The statutory grades of wheat remained unchanged until

1925.

Proposal to Establish Sample Markets

The establishment of a sample market for wheat at Winnipeg and at Fort William would perhaps have obviated the need for most of the "off grades" used in western Canada. This was much discussed following the turn of the century and provision was made for establishing sample markets in the Canada Grain Act of 1912. The 1914-18 war intervened, however, before they could be set up and, while the idea was again introduced after the war, it was never brought to fruition. The railways strongly opposed the idea, foreseeing that it would slow down their operation and increase the transit time for rail cars moving to the Lakehead.

Reaction to Stem Rust Epidemics

From 1908 to 1925 stem rust and, to a lesser extent leaf rust, periodically took a severe toll of the wheat crop in Manitoba and Eastern Saskatchewan. Not enough was known then of the large number of what are now called "races" of stem rust to enable plant breeders to effectively breed strains of wheat which were stem-rust resistant.

By 1925 over 75% of the wheat acreage in Western Canada was sown to Marquis wheat. But, following bad rust years, farmers in Manitoba started turning instead to durum wheat, which was largely resistant to the stem rust of the time, or planted a new selection of hard red spring wheat from North Dakota. This wheat had been selected from a field plot of a Russian Durum variety. It was a "rogue" wheat and named Kota; it also seemed to share the general rust resistance of the durum wheats.

Durum wheats had been grown in small volume for many years in Eastern Canada, where they were known as Goose wheat. Goose wheat grades were first defined in the General Inspection Act revision of 1885. Then in the Canada Grain Act of 1912 they appeared in the general section dealing with grades rather than in the section dealing with grain in the Western Inspection Division.

The 1925 Revision of the Act

By 1925 sufficient durum wheat was being grown in the west to necessitate its inclusion in the section dealing with grades in the Western Inspection Division of the Act.[4] Six grades for Amber Durum wheat and three for Red Durum wheat were established. (Meanwhile, the general section on grades continued to define grades of Goose wheat.) Although Red Durum was more highly rust resistant than the Amber Durum, it was only useful as animal feed. The Amber Durum was used in the pasta industry for manufacturing macaroni products.

The revised act also included a series of grades for Kota wheat, identified as No. 1, 2, and 3 Canada Western Kota wheat. Minimum bushel weight requirements were 61, 59 and 57 lbs respectively, which was one pound higher than the requirements for No. 1 and No. 2 Manitoba Northern grades. The tolerance for durum admixtures at 3, 4 and 5% was considerably higher than for the corresponding Manitoba Northern grades at 0, 1 and 3%.

The Kota grades were created because it was recognized that Kota was not "equal in value to Marquis wheat," and accordingly the variety could not be graded into the No. 1 Manitoba Hard or the No. 1 or No. 2 Manitoba Northern grades. This was a further instance of the creation of grades to enable farmers to realize the best possible price for a product that could not be graded into the "Manitoba" grades to protect the latter's quality. It was possible to do this because the variety Kota was characteristically different in appearance from the varieties being grown that were considered to be "equal in value to Marquis wheat," and so could be readily identified by country elevator buyers and grain inspectors.

Grade Definition Changes

The 1925 revision to the Act contained significant changes in the definitions of the "spring wheat" grades used in the Western Inspection Division. Principally they were:

1. The No. 1 Hard White Fife wheat grade was eliminated.

2. The grade of No. 3 Manitoba Northern wheat was defined in the manner as for the higher grades. Previously it had simply been a residual grade: any wheat not good enough to be graded as No. 2 Manitoba Northern could be graded No. 3 Manitoba Northern in the discretion of the inspector.

3. The bushel weight minimum for No. 1 Manitoba Hard was increased from 60 to 62 lbs.

4. The variety standard was changed from Red Fife to Marquis, which had largely replaced it. (Fifteen years experience had amply confirmed that Marquis had the same superb milling and baking qualities as Red Fife.

An ambiguity in the wording of the previous grade definitions was also cleared up by separating the concepts of variety and percentage of hard vitreous kernels. Previously the definition for No. 1 Manitoba Hard wheat was worded: "...and shall be composed of at least 75% of hard Red Fife wheat." The new definition said: "...shall include all varieties of hard red spring wheat equal in value to Marquis wheat," and further "...shall contain 75% of hard vitreous kernels." Additionally, No. 1 Manitoba Northern was to have at least 60% hard vitreous kernels, with No. 2 Manitoba Northern containing 45%.

By this time, hard vitreous kernel percentage in hard spring and hard winter wheats was widely considered to be closely related to protein content. The United States, in defining their first federal grain standards in 1916, had set up a classification for hard spring and hard winter wheats based on percentages of hard vitreous kernels, each classification then having a series of grades. This focused the attention of wheat buyers on hard vitreous percentage classification and grading, and Canada responded by spelling out more clearly wheat had been implied by the grade definitions for many years.

The Ambivalent No. 2 Northern

The No. 2 Manitoba Northern grade became something of a "hermaphrodite." The new definition called for

> ...hard red spring wheat, equal in value to Marquis wheat ...not less than 58 pounds to the bushel... and shall contain 45 percent of hard red vitreous kernels; or may be composed of soft varieties of red spring wheat which shall be sound, reasonably clean, weighing not less than 60 pounds to the bushel and contain 60 percent of red kernels...[5]

It is difficult to imagine what the Board of Grain Commissioners had in mind when they made this change. There was no discussion of it in parliament, so it seems likely that the change was requested by the chief inspector. With the periodic epidemics of stem rust that were occurring, farmers were anxious to find varieties that were rust-resistant and were experimenting with varieties and selections for which great claims were often made. This "opening up" of the No. 2 Manitoba Northern grade was probably to find a place for these varieties and to avoid having to set up special grades for them, as had been done for Kota wheat.

Variety Licensing

For many years the business of selling seed wheat had been a great game for charlatans. Most good varieties went by a half-dozen or more names and their sellers made extravagant claims for each one of them. In an attempt to control the situation, the federal Department of Agriculture in 1923 introduced some amendments to the Seed Control Act of 1905, making grading of seed mandatory and establishing the principal of licensing for varieties. The Act of 1905 had been concerned with freedom from noxious weed seeds and percentage germination; under the revised act, data had to be presented to establish that a new variety was in fact different from established varieties, and varieties which were not licensed could not be advertised for sale as seed. The Act was renamed the Seeds Act (1923) and the acceptable varieties in current use in 1923 were listed, which constituted licensing. Henceforth, any new variety had to be tested before it could be licensed. This achieved the desired control over seed grain, but also raised some new questions concerning the ground rules for granting licenses for the federal Department of Agriculture.

It was intended that licenses would only be granted to new varieties showing merit for use in Canada, but the Act did not actually say so. The Department of Agriculture was operating on the principle that "...no variety (would be) eligible to receive a license when found to possess qualities such as may impair its value for commerce..."[6], and this was subsequently spelled out in the amendment to the Seeds Act in 1928. In the meantime, the Cereal

Crops division of the Central Experimental Farm at Ottawa requested and was granted a license for a new wheat variety which appeared to show merit for use in Canada. The year was 1926, and the variety was called Garnet. It matured about ten days earlier than Marquis wheat and yielded very well in the northern areas of Western Canada where it quickly took over from the older varieties being grown.

Quality of Garnet Variety Questioned

Great controversy surrounded Garnet wheat over the next ten years, while questions were raised as to whether it really possessed "...qualities such as may impair its value for commerce."[7] Tests of its milling and baking quality made by the Cereal Crops Division at Ottawa had indicated that it was in the same class as Marquis Wheat. But when the Canadian milling industry got hold of some samples for trials, the millers did not agree. Further tests were made by the Dominion Grain Research Laboratory, which had been closed down for political reasons during most of 1924 and 1925 but had reopened in late 1926, which reported that Garnet was not equal in quality to Marquis. The Board of Grain Commissioners responded by declaring Garnet wheat ineligible for the No. 1 Manitoba Hard and No. 1 Manitoba Northern grades.

The Experimental Farms Service, of which the Cereal Crops Division was a part, was established in 1886 under William Saunders. From the start he maintained the policy that no varieties of wheat should be introduced into Western Canada which might in any way jeopardize the splendid reputation of Western Canadian wheat on the world market. Charles Saunders, who became Dominion Cerealist in 1903, augmented this policy in 1904 by establishing a laboratory to test the comparative milling and baking qualities of different wheats. The facilities were considerably expanded and improved in the mid 1920s, and it was results from this laboratory that were now being called in question by other cereal chemists in Canada.

References:

1. 2 Geo. V. Ch. 27 (1912).
2. 7-8 Edw. VII Ch. 36 (1908).
3. C.B. Piper, Principles of the Grain Trade of Western Canada, The Empire Elevator Company, Winnipeg, Man., 1917, p. 46.
4. 15-16 Geo. V Ch. 33 (1925).
5. 15-16 Geo. V Ch. 33 (1925).
6. Report of the Cereal Crops Division, Canada Department of Agriculture, Ottawa, Ontario, 1930.
7. Report of the Cereal Crops Division, 1930.

CHAPTER 11

THE TEST OF THE "EQUAL TO MARQUIS" PRINCIPLE

Garnet was a fine-looking wheat which, because of its early ripening habit, often produced an excellent, high grade product at the country elevator. One of its characteristics was that it produced a very bright, handsome sample if it matured properly and, as a result, generally it graded as No. 2 Northern, the highest grade for which it was eligible.

Reaction to Garnet Wheat

But the chemists had tested Garnet and found it to be wanting; it was difficult to mill, having a very tough, horny endosperm, and it did not bake as well as Marquis. The doughs were short and stiff, the loaves were not as large in volume as those from Red Fife and Marquis, the crumb was yellowish rather than white, and Garnet appeared to be low in protein.

Considerable attention was being given at this time to protein content of wheat in Western Canada. The mills were regularly carrying out surveys to determine geographic areas producing high and low protein wheat, because they wanted high protein wheats for their export flours. It generally became known that areas where Garnet was being grown were "low protein" areas, but farmers who grew it argued vociferously that there was nothing wrong with Garnet. It was simply a matter of its protein being low, they claimed: when compared with low protein Marquis, they said, the two wheats were of equal quality. However, ten more years of extensive testing did not change the cereal chemists' verdict on Garnet.

In the meantime, the U.K. market was beginning to react adversely to the increasing percentages of Garnet wheat in the No. 2 Manitoba Northern grades being shipped out of Canada's Pacific coast ports. Most Garnet wheat was grown in the foothills of Alberta and the more northerly growing regions of Alberta and Saskatchewan (the areas where Garnet offered the greatest advantages to the producer), and so there was a higher proportion of this variety in shipments from Vancouver than from the east coast ports. By 1930, cargoes of No. 2 Northern shipped from Vancouver averaged 54% Garnet, with some individual cargoes containing a much higher percentage. Pressure mounted, both from the Canadian milling industry and from millers overseas, to establish separate grades for Garnet. A precedent had been set by Kota wheat, they said, for which separate grades had been established in 1925, and Garnet was being grown on a much wider scale than Kota ever had been. Consequently there was considerable pressure to have it admitted to the top grades by those responsible for its release, and by the producers who were growing it, and by their political representatives.

Proposal for Garnet Grades

In the fall of 1931 the Western Standards Committee passed a resolution calling for the establishment of three grades for Garnet Wheat and its exclusion from "Northern" grades higher than No.

4. The Board of Grain Commissioners forwarded the proposal to the Department of Trade and Commerce and the government responded by referring it to the Select Standing Committee on Agriculture and Colonization of the House of Commons. Hearings began on April 5, 1932 and the evidence presented to the Select Committee occupied over two hundred pages. The Minister of Agriculture and his associates held the view that no change was necessary, while the Minister of Trade and Commerce and his associates from the Board of Grain Commissioners and the milling industry supported the proposal. The hearings wound up on May 19 with the Select Committee recommending that the Western Standards Committee's proposal be implemented for the 1933-34 crop year.

For a number of reasons no action was taken until 1934, when a revision to the Canada Grain Act provided two grades for Garnet wheat and allowed it freely into No. 3 Manitoba Northern; this change became effective on August 1, 1935. Thus the revision was a compromise which served only to postpone the hard-nosed decision that still had to be made. (It would not be until three more years had elapsed - on August 1, 1938 - that the grade of 3 C.W. Garnet was established and Garnet was removed from No. 3 and No. 4 Manitoba Northern. And not until 16 years later - in 1954 - that a commercial grade of No. 4 C. W. Garnet was established.*)

The Garnet issue serves to illustrate the very substantial differences between the grading and handling systems in Canada and the United States. Canada set out in the waning years of the last century to displace Minnesota and the Dakotas as suppliers of high quality milling wheat and strong baker's flour to the United Kingdom. By providing a high quality product and establishing a very strong reputation for integrity, this was achieved by the early 1920s. By the mid-1920s Canada had become the greatest wheat exporting nation in the world.

During this time the U.S. domestic demand for wheat had increased substantially, so that the overwhelming bulk of U.S.-grown wheat was sold for domestic consumption. While the U.S. operated a grading system which appeared on the surface to be similar to that used in Canada, the wheat was sold mostly to the ultimate consumer (the U.S. milling industry) through sample markets. Sample markets dealt with wheat one boxcar at a time and prices were paid according to an analysis of each carlot; thus, within a grade, premiums and discounts might operate for moisture, bushel weight, dockage, protein content, and variety, as well as any other factor which a buyer wished to take into account.

Canada never established a sample market, although provision was made for it in the Canada Grain Act of 1912. The domestic milling industry managed to evolve a pseudo sample market system, without having to pay premiums, by establishing large mills in the best wheat growing areas of Western Canada or on their fringes, such as at Winnipeg, Keewatin, and Kenora. The big milling companies carried out extensive surveys of the new crop, including tests of the protein content of wheat from the various areas, and by and large could select the best wheat because of their transit privileges with the railway. They could order in cars from certain areas, select the best on the basis of tests made on probe samples of individual cars, and ship the other cars to the Lakehead. Most of the big mills had very substantial wheat storage capacities and could cushion themselves against changes in quality which could occur from one crop to the next.

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* C. W. = Canada Western

Establishment of Garnet Grades

In Canada, it was the grading and handling system, not grain merchants working in sample markets, which had to ensure that the great bulk of the crop was delivered to overseas markets in uniform, consistent, and reliable "packages." This the system managed to do increasingly well during the first forty years (i.e. 1885-1925) as attested to by Canada's position as the world's greatest exporter of wheat, and that Canadian wheat generally achieved the highest prices in world markets. The major factor in achieving this success was the overwhelming predominance of first Red Fife, and later Marquis, among the wheat varieties grown in Western Canada. Analyses made by the Cereal Division of the Central Experimental Farm at Ottawa[1] indicated that the Export Standard Samples for the crop of 1926 showed Marquis to make up 66% of No. 1 Northern, 72% of No. 2 Northern, and 63% of No. 3 Northern. These estimates were if anything conservative, being considerably below other less-scientifically based estimates of the time, some of which indicated that as much as 90% of the crop was Marquis variety.

The licensing and propagation of Garnet wheat introduced the first real deviation from the Red Fife/Marquis quality. Because of its excellent agronomic qualities, Garnet spread very quickly into the northern and far western areas of Western Canada. As earlier indicated, the Board of Grain Commissioners ruled that it was not eligible for No. 1 Northern but by 1929 it was already showing up in substantial quantities in export cargoes of No. 2 and No. 3 Northern.

That year, analyses of 29 export cargoes showed an average of 26% of Garnet wheat in No. 2 Northern.[2] For 1930, the study separated Atlantic and Pacific shipments and showed an average of 33% Garnet in No. 2 Northern cargoes from the Atlantic, and 54% in those from the Pacific. By 1934, No. 2 Northern from the Pacific averaged 74% Garnet while the same grade at the Atlantic averaged 38%. This meant that some parcels out of the Pacific would be virtually 100% Garnet while some parcels out of the Atlantic would be close to 100% Marquis. Thus the uniformity of Canadian Wheat exports of the same grade was being seriously disturbed, just at the moment when the world economy was heading into the problem marketing years of the Great Depression.

In the Liverpool market, Pacific Manitobas were discounted with respect to the same grades from the Atlantic ports. Consequently, for the 1935 crop, a 1934 revision to the Canada Grain Act established two grades of Garnet, and excluded Garnet from No. 2 Northern, requiring the latter to be Marquis or equal in quality to Marquis. At the Pacific ports the quantity of Garnet in cargoes of No. 2 Northern dropped dramatically to less than 2%. No. 3 Northern, on the other hand, averaged 42% Garnet and by 1937 was averaging 78%. Then, three years later for the 1938 crop, a third grade for Garnet was established and Garnet was excluded from No. 3 and No. 4 Northern.

The market could now establish the value of the Garnet grades relative to the Manitoba Northern grades, and No. 1 C.W. Garnet generally found a price at the same level as No. 3 Northern. Overseas millers had indicated throughout the controversy that they might be able to use Garnet, provided it was marketed separately from the Manitoba Northern grades. But after 1938, when new varieties came along which did not mature as early as Garnet but could be graded into the top grades, production of Garnet fell off quite markedly.

Quality Tests for New Varieties

By the 1930s the testing of new varieties of wheat was firmly in the hands of the Associate Committee on Grain Research, on which the milling industry, the Cereal Crops Division, the Board of Grain Commissioners, the National Research Council, and the three Western Universities were all represented. Henceforth, decisions on whether new varieties of wheat could be considered "equal in quality to Marquis" would be taken by this Committee, and their reports would be forwarded to both the Board of Grain Commissioners and the licensing authorities at the Department of Agriculture. There continued to be differences of opinion within the Committee from time to time, but these usually were resolved by additional tests or new research programs.

The Western Standards Board Becomes Quality Custodian

The June 1934 revision of the Canada Grain Act also modified the responsibilities of the Western Standards Board, to enable it to deal with any future Garnet-type situation. The Board of Grain Commissioners was to prepare each year

> ...Tentative Standard Samples of the statutory grades of western grain and of such commercial grades as it appears likely to be convenient to establish owing to the probability that the crop will include a substantial quantity of certain kinds or varieties of grain which, because of special characteristics, cannot be assigned to any statutory grade.

The words "or varieties" was added with the accompanying explanation in Bill 53:

> ...empowers the Western Standard Committee to deal with different varieties of grain which may be developed from time to time, so that they may be graded to the best marketing advantage without interfering with the quality of our main standard grades.

This authority, together with the knowledge that the Associate Committee on Grain Research could provide a definitive ruling on whether newly developed varieties were equal in quality to Marquis, seemed to offer a mechanism for avoiding future Garnet-type problems.

International Collaborative Testing

During the Garnet affair several large samples and a small cargo of the Garnet variety were sent to millers in the U.K. and Europe to seek their opinions. This became a regular procedure during the balance of the 1930s, when several new rust-resistant varieties were evaluated in the same way. Then, following the second world war, the Associate Committee on Grain Research instituted an International Collaborative Test, in which new varieties of wheat which had been approved by the Committee as "equal in quality to Marquis" were sent, with a Marquis standard, to the major cereal laboratories in the U. K. and, later, also in Europe. Final decisions were based on the overseas laboratories' findings and opinions, plus those generated by the Committee from its member organizations.

The whole Garnet debacle very graphically illustrated the potential hazard to the grading and handling system which could be created by the introduction of new wheat varieties. This was particularly true of varieties which offered economic advantages to some producers but put other producers at risk by threatening the quality reputation of the grades they were producing.

Variety Identification by Grain Inspectors

The Garnet debacle also focused attention on the importance of variety identification. It had been possible, in 1925, to establish new sets of statutory grades for Kota wheat, for Amber Durum wheat and for Red Durum wheat. These did not create any serious problems because each could be readily identified visually and all were quite distinguishable from other varieties and types of wheat being grown. With Garnet, however, there was some question regarding distinguishability, so that when the Western Standards Board recommended establishing separate grades for Garnet, those opposed to the idea questioned the ability of the grain inspectors to identify the grain. The matter was settled quite emphatically by the submission of a set of samples of known composition, made up by the Cereal Crops Division in Ottawa, to the Chief Grain Inspector in Winnipeg.

The grain inspectors were asked to identify the percentage of Garnet wheat in each sample. The results, which were given to the Select Standing Committee during the hearings, amazed almost everyone except perhaps the Chief Inspector. Each sample containing Garnet admixture was correctly identified and the percentage of each admixture was assessed within 5% or better. The story of this feat became widely known and stood the Board of Grain Commissioners in good stead when the Garnet grades were established. And knowledge that the inspectors could readily identify Garnet wheat kept the country elevator agents on their toes, so that the percentage of Garnet wheat in No. 2 Northern at the Pacific ports dropped from 74.1% for the 1934 crop year to 1.7 for the 1935 crop year. Throughout the 1930s the Inspection Branch continued to improve its capabilities in variety identification and the inspectors were soon recognized as world leaders in this area of expertise.

After the Garnet experience it was clear that any new varieties licensed for use in Canada would have to be equal in quality to Marquis. But, with many new rust-resistant varieties being produced by plant breeders in both Canada and the U.S., identification problems were going to be created. The Americans had neither a standard to meet nor a licensing system, so new varieties were released freely south of the border. Many crossed the border unofficially, and those which were unlicensed in Canada had to be spotted and kept out of our top grades. Several U.S. varieties developed during the 1930s were clearly inferior in quality to Marquis but were widely grown in the U.S. spring wheat area. Fortunately these varieties were fairly readily identifiable, but they introduced a problem for Canadian plant breeders. If a plant breeder produced a new variety which was equal in quality to Marquis but was indistinguishable from one of the lower-quality American varieties, it could not be licensed because it would be impossible to control the U.S. variety. This meant that Canadian plant breeders now had to breed for kernel type as well.

References:

1. Report of the Cereal Crops Division, Central Experimental Farm, Ottawa, 1930.
2. J.G.C. Fraser, "The Varietal Composition of Canadian Export Wheat, 1926-1946," Scientific Agriculture, No. 29, 1949, p. 97-127.
3. 24-25 Geo. V. Ch. 26 (1934).
4. 24-25 Geo. V. Ch. 26 (1934).
5. 24-25 Geo. V. Ch. 26 (1934).

CHAPTER 12

THE GRADING AND HANDLING SYSTEM MATURES

The decade of the 1920s saw the maturation of the wheat growing economy in Western Canada. The great immigration of the immediate pre-war years had ended and the really tough years were over for the majority of the homesteaders. Gradually more land was being put into production and wheat prices were gradually improving, following the depression precipitated by the end of World War I. Farmers were agitating for political power, so that they could have some control over the abuses they felt they were subjected to by the grain trade (headquartered in that "den of iniquity," the Winnipeg Grain Exchange). But, by and large, they were well satisfied with the grading and handling system which the Board of Grain Commissioners administered, and they were proud of the world-wide reputation held by the wheat they grew.

Setting up Quality Protection

During the 1920s the components fell into place for maintaining the objectives of growing and marketing the best wheat in the world. Of primary importance among these were:

1. The establishment of the Associate Committee on Grain Research which, armed with the scientific and technical expertise to lead the world, quickly became the custodian of the "equal in quality to Marquis" concept.

2. The concept of licensing varieties, which had two major effects: it made it difficult for producers to grow varieties other than those which had been licensed, and no variety could be licensed if it represented a threat to the commercially established quality of an existing product (this principle was incorporated into the Seeds Act in 1928).

3. The extension of the "equal in quality to Marquis" concept to the grade of No. 2 Manitoba Northern.

4. Plant breeding in Western Canada established permanently (previously it had been done in Ottawa) with the setting up of the "Rust Laboratory" in Winnipeg in the mid-1920s.

The basis was thus provided for bringing about what was implied, but not even imagined, when the original grades for wheat were established in 1885. At that time it was envisaged that Red Fife wheat would be grown forever in Western Canada. During the 1920s the operational basis for establishing a fixed genetic quality base for Canadian Hard Red Spring wheat was put in place, and it has not been seriously disturbed since that time. The system that resulted has been unmatched anywhere in the world although most other large wheat-producing countries would like to duplicate some aspects of it and are working toward that end.

The grading and inspection system for Western Canadian wheat was conceived as a means of marketing for export a product of the highest possible quality and of the greatest possible uniformity within grades, from cargo to cargo and from year to year. The legislation of 1899 had clearly established that Canada would opt for maximizing the quality enhancement that results from blending parcels of the same grade in a bulk handling system. It also provided a means for preventing grades from being debased through mixing at grain terminals. In the 1920s the necessary mechanisms were set up to ensure that new varieties of wheat could be introduced that would enhance productivity without disturbing the basic quality standard begun with Red Fife and continued with the "equal in quality to Marquis" principle. The major source of variability, which still was not controlled by the system, was the protein content of the grades.

The Practicability of Grading Protein Content

Not much attention had been paid to protein content before the mid-1920s. It was well known that Western Canadian wheat was high in protein and that this property was considered a highly desirable feature by the buyers of wheat in overseas markets, since Canadian wheat was usually blended with low protein domestic wheats in many European countries. The Americans, because of their sample markets and because of the largely domestic utilization of their spring wheat, were much more aware of protein and had been paying premiums for it in the sample market for some years.

One of the first projects outlined by the Associate Committee on Grain Research in 1926 was a survey of the protein content of Western Canadian wheat. This was undertaken by the Grain Research Laboratory beginning with the crop of 1927, and has been conducted every year since. The results of the first survey were an eye-opener, although surveys made in previous years on a more limited scale by the large milling companies had provided some idea of what the situation would likely be.

The survey indicated that No. 1 Manitoba Northern could vary from 9 to 18% in protein content from farm to farm, and that other grades showed much the same variability. It also indicated that some areas of Western Canada produced low protein wheat while others produced high protein wheat, but within each of these general regions there were examples of both high and low protein wheat. (Subsequent surveys indicated there were also considerable variations in the overall average protein of the crop from year to year.) The 1927 wheat crop happened to have the lowest average protein content ever recorded, at 11.4%, while the highest recorded to date has been 15.1%.

Farmers near the U.S. border were aware that sometimes their American colleagues were paid premiums by the milling companies for their wheat, when it was high in protein. Once the results of the 1927 survey became known (and they were subsequently confirmed by the surveys of 1928 and 1929) the farmers in the "high protein region" of south and central Saskatchewan began to agitate for the introduction of protein as a grading factor. Their yields were lower than those obtained by producers farther north and west, and they hoped to compensate for this by getting higher prices for their grain.

The practicability of grading protein content was raised in the House of Commons and the matter was referred by the government to the Select Standing Committee on Agriculture and Colonization. The National Research Council and the Board of Grain Commissioners were also directed to investigate the matter and report back to the Committee.[1] Hearings by the Select Committee opened at the end of February 1928 and continued intermittently for over a year. The Select Committee came to no conclusion but recommended further investigation into the attitude of European buyers toward paying premiums for protein.

Much of the evidence considered by the Select Committee was concerned with how producers could be paid for the protein in their individual deliveries to country elevators. It was clear that this problem had not yet been solved in the U.S., where there were already sample markets and where protein premiums were paid on carlots arriving at terminal markets. It was also clear that it would be much more difficult to achieve in Canada, because most of the wheat was exported and none of it passed through a sample market. The investigation subsequently carried out in the European market indicated that importers were largely satisfied with deliveries of Canadian wheat and were not prepared to pay premiums for specific protein levels.[2] Thus the matter was dropped, although it continued to attract interest for many years.

Eventually, however, during the 1960s the U.S., the U.S.S.R., and Australia began to market some of their wheat abroad on the basis of guaranteed protein levels, and since 1972 Canada has marketed all of its top grade wheat on a protein basis. But the problem of reflecting premiums for protein back to the individual producer has still not been entirely resolved.

Evaluating Grain Drying at Terminals

Grain drying was a continuing potential threat to uniformity of quality in the wheat grades, and was recognized by the Associate Committee on Grain Research as an area requiring urgent study. Periodically a really wet harvest season would occur, which would result in substantial volumes of wheat being classified as "No Grade" on account of its high moisture content. Farmers didn't have drying facilities, and neither did country elevators. It was only at grain terminals that facilities existed for drying, although during emergencies the facilities at U.S. terminals on the Great Lakes were also used, along with floating driers operated by American entrepreneurs.

The first big crisis occurred with the 1912 crop, which produced about 40 million bushels of No Grade wheat, a substantial portion of which had to be dried. The 1917 crop also produced almost 40 million bushels of No Grade wheat, and then the problem did not arise again until 1924 when the level was up to 26 million bushels. The following three years were disastrous: 105 million bushels in 1925, 171 million in 1926, and 179 million in 1927. In the 1926-27 crop year alone, the amount of No Grade wheat inspected was a massive 51% of total wheat inspections.

With such enormous quantities to be dried in the mid-1920s, there was considerable concern abroad that Canada might be shipping drier-damaged grain. It was known that throughput was the major objective in operating the driers and not too much attention was paid to the drying temperature, except to keep it below the point where the wheat was roasted or damaged sufficiently to be apparent to the inspector. Early rules had precluded dried grain from being graded into a straight grade higher than No. 3, but in 1925 the rules were changed to allow wheat either to be classed as "Dried" to the grade to which it belonged or given a straight grade, at the option of the inspector.

Consequently, the Associate Committee on Grain Research undertook an extensive investigation of the proper temperature at which Canadian wheat should be dried if it was to avoid damage. Much of the work was done with an experimental grain dryer built by the University of Alberta, with the conclusions from this work being confirmed in the commercial dryers. The results of the study were released in 1929 and confirmed that wheat was not necessarily damaged by drying.[3] Provided the temperature of the drying air did not exceed 180 F (82 C), the report concluded, any of the commercial dryers being used at elevators in Western Canada could dry wheat without any evidence of damage. The Board of Grain Commissioners established conditions for the start-up and operation of dryers at terminals and placed them under the nominal supervision of the inspector at each elevator.

The 1930 Revision of the Canada Grain Act

In 1930 the Canada Grain Act was fairly extensively revised.[4] The grades of grain, rather than being described verbally as in the past, were listed on a chart which defined more factors than the previous format and showed more clearly the relationship between the various grades in a class. Some of the major revisions were:

1. The "hermaphrodite" nature of No. 2 Manitoba Northern, originally established in the 1925 revision of the Act, was eliminated. The grade now had to be made up of Red Spring wheat of "good milling quality" and have a minimum of 50% hard vitreous kernels.

2. Two grades of No. 4 Manitoba Northern were added to the statutory grades of the "Manitobas," one following on from No. 3, as would be expected, and the other for sound but light weight, rusted or shrunken wheat having a minimum weight of 55 lbs per bushel.

3. The grades of Alberta Winter wheat were reduced from eight to three. The new grade No. 1 was for Alberta Red Winter wheat only, with grades

No. 2 and 3 unrestricted as to color.

4. Three statutory grades for White Spring wheat were established, in place of the commercial grades for this class, which had been in use since the 1926/27 crop year. The variety "Quality" was named as the standard variety in the No. 1 C.W. White Spring grade.

5. With the proliferation of classes that was occurring (e.g. Amber Durum, Red Durum, White Spring, Red Spring, Red Winter, etc) a series of six Mixed Wheat grades was established to deal with excessive admixtures of wheat of one class with another.

6. The grades for Kota wheat established in 1925 were omitted. These grades had been dropped the previous year through disuse, as production of Kota wheat had very rapidly diminished following establishment of the statutory grades.

No action was taken on Garnet wheat. This was put off until 1935, when the act was again revised to create two grades of Canada Western Garnet wheat and to require that wheat which was graded as No. 2 Manitoba Northern be "equal in quality to Marquis." Although Bill 53 introducing the act was passed in June of 1934[5], the grade changes were not to become operative until August 1, 1935.

References:

1. Interim Report on Protein Content as a Factor in Grading Wheat, The Associate Committee on Grain Research; National Research Council, Ottawa, Bulletin No. 13, 1929.
2. R. Newton, Report on Inquiry in Europe Regarding the Feasibility of Using Protein Content as a Factor in Grading and Marketing Canadian Wheat, National Research Council, Ottawa, 1930.
3. The Drying of Wheat, The Associate Committee on Grain Research; National Research Council, Ottawa, Report No. 24, 1929.
4. 20-21 Geo. V Ch. 5 (1930).
5. 24-25 Geo. V Ch. 26 (1934).

CHAPTER 13

FIFTY YEARS OF THE "MANITOBAS": AN OVERVIEW

The grades established in 1885 for wheat grown in Manitoba and the Northwest Territories gave rise to the expression "Manitobas," which was used to refer to the statutory grades of the Manitoba Hard series and the Manitoba Northern series. (These grade names were not changed until 1971, when the grades were relabelled to reflect the more global nature of the wheat growing area.)

There were several reasons for creating the Manitoba grades based on Red Fife wheat. Specifically they were:

1. To take maximum advantage of the soils and climate of Western Canada by producing the finest bread-making wheat in the world. Because of the high cost of moving wheat from Western Canada to the markets opening up in Europe, high quality wheat was considered to be the most viable economically. Yields were so high in the early years after the land was broken, that producers were quite content to use Red Fife wheat rather than other varieties that might have been grown.

2. To catch the imagination of prospective immigrants from Europe by demonstrating the fertility of the land and the high quality of production.

3. To outdo the producers in Minnesota who had been growing some Red Fife wheat and were marketing it under a single grade. The objective was to usurp the United Kingdom market for bread wheat, at that time dominated by Duluth spring wheat.

4. To provide Eastern Canadian mills with a ready source of high quality wheat for domestic and export flour.

5. To allow Eastern grain interests, which would be involved in moving Western wheat into export channels, the opportunity to profit from quality "dilution" as the wheat passed through their hands.

Table 1 shows production of wheat in Western Canada over the 50 years from 1885 to 1935. Although acreage devoted to wheat was continually increasing throughout most of this period, production was slow to increase at first. Excellent growing conditions in 1891 produced the first real quantum jump in production and exports shared the jump in the following year (1892), when Manitobas were first listed on the Liverpool market. There was a second jump in production with the crop of 1901, which was double that of the previous record (1895), and again was reflected in the following year's exports (1902). Significantly, immigration did not really flourish until the turn of the century.

The table lists the quantity of western-grown wheat inspected each year, from which we can infer how in the early years the eastern entrepreneurs benefitted from the opportunities to blend some of their local wheats into the Manitobas. For example, in 1887 the quantity of spring wheat graded exceeded the size of the western crop. This occurred again in 1892 and reached a peak in 1896, when the wheat inspected was 146% of the estimated western spring wheat crop. This led to the legislation of 1899, which made western inspection mandatory on all wheat moving east or south of Winnipeg. There was an immediate drop in the percentage of the crop being inspected, and the ratio remained remarkably consistent for the next 20 years.

The major feature characterizing the first 50 years was the high percentage of Western Canadian wheat moving to the U.K. market. During the first 25 years our exports to the United Kingdom averaged more than ninety percent of our total exports (column D/C). Canada's percentage of the U.K. market (column D/E) was modest prior to 1900 and normally represented less than ten percent of total U.K. imports. Then it gradually increased, until by the middle 1920s we had reached our major objective and were supplying virtually one hundred percent of the U.K. market for imported wheat.

The good prices obtained during the late war years and in the early 1920s undoubtedly resulted in many farmers mechanizing their operations, so that by 1923 a record 455 million bushels of wheat were produced. A significantly higher percentage of the crop was being marketed (column B/A in the table), which probably indicated that less wheat was being retained on the farm for animal feed. The crop year 1923/24 saw a record 289 million bushels exported, making Canada the world's leading exporter of wheat.

There was a strong feeling that we must be doing something right, although there were still some unsolved production problems. The grades of 1885, by then considerably thinned out (there were only four left of the original 11 grades) and slightly modified from their original form, were now well known all over the world. In addition, the domestic market also was increasing. The Canadian milling industry was experiencing a bonanza in flour exports, in 1923 exporting just over 11 million barrels of flour and producing a further 8.4 million barrels for domestic consumption, accounting for 85.3 million bushels of that year's wheat production.

The euphoria continued through 1928, with a record production of 547 million bushels followed by record exports of 354 million bushels, including an all-time high of 210 million bushels to the U.K. But in 1929 the bottom fell out: production (at 284 million bushels) was just over half that of 1928, exports were almost 200 million bushels less than those of the previous year, and exports to the U.K. were halved, representing only half of the U.K. requirement. The drought conditions which characterised so many of the depression years had begun. The short crop of 1929 normally would have reflected increased prices, but following the market

	A	B	C	D	E			
	Wheat Prod. West. Canada m. bu.	Western Wheat Inspected (crop yr.) m. bu.	Wheat Exports (crop or fiscal) m. bu.	Wheat Exports to U.K. (crop or fiscal) m. bu.	Total U.K. Wheat Imports m. bu.	$\frac{B}{A}$ %	$\frac{D}{C}$ %	$\frac{D}{E}$ %
1885	7.4	2.6	2.3	2.0		35	87	
86	5.9	4.8	3.4	3.1		82	91	
87	12.4	13.5	5.6	5.0		109	89	
88	7.0	6.8	2.2	1.4		97	64	
89	7.2	6.0	0.5	0.4		83	80	
90	14.7	13.1	0.4	0.4		89	100	
91	23.2	20.0	2.1	1.0		86	48	
92	14.4	15.0	8.7	6.8		103	78	
93	15.6	13.0	9.3	8.6		83	92	
94	17.2	15.2	9.3	9.1		88	98	
95	31.8	28.1	8.8	8.8		88	100	
96	14.4	21.1	9.9	9.7		146	98	
97	18.3	20.0	7.8	7.7		110	99	
98	25.3	24.2	19.0	18.1		95	95	
99	28.0	26.3	10.3	9.9		94	96	
1900	17.0	12.4	16.8	16.0	128	73	95	12
01	62.9	45.6	9.7	8.6	130	72	89	7
02	67.0	51.8	26.1	25.2	151	77	96	17
03	56.1	40.4	33.0	30.7	164	72	93	19
04	56.0	39.8	16.8	16.3	182	71	97	9
05	84.2	64.6	14.7	11.3	182	77	77	6
06	102.5	73.1	40.4	36.0	174	72	89	21
07	72.0	53.4	25.5	24.4	181	74	96	13
08	107.5	74.1	43.6	43.0	170	68	99	25
09	145	95	49.1	45.9	183	66	93	25
10	120	88	49.7	46.6	196	73	94	24
11	194	146	45.8	43.6	183	75	95	24
12	184	142	64.5	60.3	204	77	93	29
13	209	155	93.2	77.7	198	74	83	39
14	140	108	120.4	108.6	194	77	90	56
15	364	251	71.9	64.3	166	69	89	39
16	245	192	157.7	140.4	187	78	98	75
17	218	156	189.6	152.0	171	72	80	89
18	181	134	59.2	48.0	108	74	81	44
19	177	123	63.9	35.1	133	69	55	26
20	244	187	136.2	34.7	204	77	25	17
21	285	232	158.5	112.3	150	81	71	75
22	381	297	229.7	174.1	180	78	76	97
23	455	389	289.2	200.1	188	85	69	106
24	240	214	147.0	115.8	221	89	79	52
25	372	352	275.6	198.4	181	95	72	110
26	385	336	251.3	185.3	180	87	74	103
27	457	397	288.6	201.7	206	87	70	98
28	547	466	354.4	209.6	193	85	59	109
29	284	220	155.8	105.0	209	77	67	50
30	397	289	228.5	135.1	196	73	59	69
31	301	259	182.8	101.6	223	86	56	46
32	423	324	240.1	156.5	197	77	65	79
33	263	228	170.2	114.8	210	87	67	55
34	264	232	144.4	100.7	192	88	70	52
35	260	218	232.0	162.9	189	84	70	86

crash prices fell steadily throughout the crop year. By July 1930 prices had fallen to the lowest level since December 1923.

Despite reasonably good crops in 1930 and 1932, our exports to the U.K. never recovered to the peak levels of the 1922 - 1928 period. In 1935, from a relatively short crop, our exports to the U.K. during the crop year totalled 163 million bushels; this represented 86% of the U.K. market and, at the same time, 70% of our wheat exports. But it was the last year (aside from the war years) when we would supply such a substantial share of the British Market.

It is hard to escape the impression that Garnet wheat had a lot to do with our deteriorating position in the U.K. market in the years 1929-1934. It was during the 1929-30 crop year that substantial percentages of Garnet wheat started showing up in No. 2 Northern, reaching a peak in 1934. For the 1935 crop, Garnet was kept out of No. 2 Northern and the best of it was segregated into the No. 1 and No. 2 C.W. Garnet grades, with the lower qualities going into No. 3 Manitoba Northern or lower grades. From a slightly smaller crop than the year before, Canada's 1935 exports to the U.K. jumped 60%. This was an encouraging response to a change which we had agonized over making for five years. The U.K. millers had made it quite clear in 1929 that they would like to see the change made, and undoubtedly their decreased purchases in subsequent years reflected their displeasure at our refusal to take action. Henceforth, we would be careful to consult them before introducing any new varieties.

It was noted earlier that the grades of wheat in use at any time consisted of the statutory grades defined by act of Parliament (or, prior to 1899, by Order-in-Council) and the grades set by the Standards Committee each year, which were represented by standard samples. A study of the statutory wheat grades used in Western Canada gives a reasonable view of what was going on and of the trends that developed over a period of time. But it does not reflect the realities to nearly the same extent as does a study of the grades that evolved and were inspected. Fortunately, we have reasonably complete records of the grades of wheat inspected each year in Western Canada[1,2,3], although no records remain of the purpose behind some of the grades that were used. Examination of these records suggests also that occasionally an inspector would invent a grade for a special purpose, with the grade being analogous to one of the already established statutory grades.

Reference was also made earlier to the "Frosted" grades established by the Standards Committee late in 1885. There were three of these grades and all were in regular use from 1885 to 1900, except for the years 1890 and 1894, when apparently they were not needed. They were discontinued in 1901 when the Standards Committee established No. 4 Spring wheat, and then added No. 5 in 1904 and No. 6 in 1907.

From 1888 to 1901, the No. 3 Manitoba Hard grade was used continuously, and in two of these years (1893 and 1894) the No. 4 Manitoba Hard grade also was used. This practice began the year No. 3 Northern was dropped as a statutory grade (1888), leaving No. 3 Spring as the residual grade for wheat which could not be classified as No. 2 Hard or No. 2 Northern. But, because No. 3 Spring could be any kind or variety of spring wheat (hard, soft, red, or white), its price would be relatively low; thus the Committee set standards for both No. 3 Manitoba Hard and No. 3 Manitoba Northern throughout the period, until No. 3 Manitoba Northern was re-established as a statutory grade in 1901.

Similarly, after the statutory grade of No. 1 Hard White Fife wheat was established in 1888, the grades of No. 2 Hard White Fife and Rejected Hard White Fife persisted until 1901.

Reference was made in Chapter 7 to the appearance, in 1891 and 1892, of No. 1, 2, and 3 Regular grades, for which no explanation can be found. The grades co-existed with the three Frosted grades, four Manitoba Hard grades, and three Manitoba Northern grades. In 1891 the three "Regular" grades represented 25% of the wheat inspected that year, then in 1892 they represented only 6%, and were never used again. Apparently the unidentified problem they were designed to take care of occurred only in the crop of 1891.

The Standards Committee was authorized to establish special grades for wheat which could not be classified into the statutory grades by an amendment to the General Inspection Act assented to on August 28, 1891[4]. The "Regular" grades were probably the first grades established under this directive, although in reality the precedent was set in 1885 for the "Frosted" grades, considerably before the statutory authority existed.

An 1899 revision to the General Inspection Act[5] authorized the Standards Committee to establish "Commercial" grades for wheat which did not fall into the statutory grades. However it was not until the 1901/02 crop year that the first Commercial No. 4 grade was established, although by the 1907/08 crop year the Committee was setting Commercial grades of No. 4, No. 5, and No. 6 wheat. This ad hoc setting of grades continued to be a major function of the Standards Committee until 1930, when it was required by the revised Canada Grain Act to approve standards for all the statutory grades, all the commercial grades, and the export standard samples.

Quantities of winter wheat began appearing in the 1891/92 crop year and were invariably graded as Rejected Mixed Winter or Rejected Red Winter wheat. The low grades convinced producers to cease growing it, or they kept it at home for feed, but they were not happy with the situation. One can only conjecture whether proper grades to deal with Alberta-grown winter wheat were a part of the agreement establishing Alberta as a province, for in the 1905/06 crop year we find small quantities of winter wheat being graded by the Manitoba Inspection division into No. 1, 2, and 3 Mixed Winter, No. 1, 2, and 3 White Winter and No. 1, 2, and 3 Red Winter wheat. (These grades were the same as those in use in Eastern Canada.) The same thing happened again the next year, with most of the winter wheat being graded into the top grades.

This turnabout in the grading of winter wheat produced in Southern Alberta, from rejection in the 1888 to 1897 period to acceptance in the 1905 - 1917 period, was most likely caused by a change in the varieties of winter wheat being grown. Early attempts at growing winter wheat on the Canadian prairie were probably made with winter wheats brought by homesteaders from Europe or from Ontario. These proved to be unsuitable and did not produce wheat suitable for commercial use. Much greater success was achieved in the later period by using winter wheats which were already proving themselves in neighboring Montana. These varieties generally moved up from Kansas and had originally been brought in from Russia; in general they were hard red winter types rather than the soft red and soft white types grown in eastern Canada and the eastern U.S.

The 1906 revision of the Inspection and Sale of Grain Act[6] included three grades for Alberta winter wheat, but only in the general section of the act. In the 1907/08 crop year 1,675,090 bushels of winter wheat were inspected in the Manitoba Inspection Division, and classified into the following grades:

* Mixed Winter wheat, No. 1, 2, and 3;
* Alberta Red Winter wheat, No. 1, 2, 3, 4, and Rejected;
* Alberta White Winter wheat, No. 1, 2, and 3; and
* Commercial wheat, No. 4, 5, 6, Feed, and Feed No. 2.

Yet it was not until the following year that the Act was amended to include Alberta Winter wheats with the other grades for Western Canadian wheat, listing three grades of Alberta Red Winter, three grades of Alberta White Winter, and two grades of Alberta Mixed Winter wheat.

The greater variety of grades, combined with the better wheat varieties that had become available, probably contributed most to the rapid expansion of winter wheat growing at this time. The next crop year, 1908/9, production was more than 3.3 million bushels. It then fell to less than one million bushels two years later, but peaked again in 1911/12 at 3.5 million. From then on, interest in winter wheat waned rapidly, with inspections declining steadily to reach only 21,040 bushels in 1924/25. The handling system was now encumbered with a series of grades for Alberta Winter wheat which exceeded the number of grades used for the Hard Red Spring wheat crop. One can only surmise that they were established for political reasons rather than because there was a pressing need for them.

It was only after World War 2 that Canada's Department of Agriculture began a serious breeding program to improve the varieties of winter wheat used in Western Canada. Winter wheat production did not exceed the 1911/12 level again until 1963, when a new variety gave hope of price parity with spring wheat.

A period of stability began with the setting of a No. 6 Commercial grade in 1907. The grades in use for spring wheat then were:

* No. 1 Manitoba Hard;
* No. 1, 2, and 3 Manitoba Northern; and
* No. 4, 5, and 6 Wheat, and Feed and Feed No. 2.

The "off" grades were Rejected, No Grade (for tough or damp wheat), and Condemned, but by 1915 smut had become such a common cause for rejection that a category of Smutty was recognized separately from the Rejected class. Then, when stem rust started to severely affect the crop, Commercial grades No. 4, 5, and 6 Special were established to accommodate wheat which was very light in bushel weight but otherwise sound and mature. These grades were in use for the crops of 1917, 1918, 1923, 1924, 1925, 1931 and 1932.

When, in 1919, spring wheat grown in British Columbia began to appear in the commercial system, the three spring wheat grades from the general section of the act were brought into use and were annotated "B.C. Spring." The Goose wheat grades from the general section of the act were used to deal with small quantities of Durum wheat which were grown in the rust area in 1905, 1906, and 1907, and again in 1918 and 1919. The quantities of Durum wheat being grown increased rapidly after the war as farmers tried to gain relief from stem rust epidemics, and in 1920 three Commercial grades of Amber Durum wheat were set. And then a fourth Amber Durum grade appeared in 1922, along with a catch-all Commercial grade for Red Durum. A year later a Commercial grade No. 5 Amber Durum was set, and the year following (1924) a No. 6 Amber Durum. With the revision of the Canada Grain Act in 1925, the six Amber Durum grades became statutory grades and the Red Durum Commercial grade became a series of three statutory grades of Red Durum.

Concurrent with the increasing use of Durum wheat, farmers in Manitoba and Eastern Saskatchewan were also growing the North Dakota variety called Kota, which presumably was being graded into No. 2 Manitoba Northern because its quality was known to be lower than that of Red Fife and Marquis. Its usage probably peaked in 1923 or 1924, although there is no record at what level. In 1925 a series of three statutory grades was established for the Kota variety (it is interesting to note that the statutory grades were not preceded by commercial grades, as had happened with the Durums in 1920) and a price was attached to them by the market. This price apparently was sufficiently low to act as a very serious disincentive to farmers: in 1925/26 some 1.4 million bushels were inspected into the Kota grades, but by 1928/29 only 34,000 bushels appeared and the grades were not used again. Farmers turned to Durum instead, causing the volume inspected to increase from 7.4 million bushels in the 1925/26 crop year to 26 million bushels in 1928/29.

Farther west, out of the stem rust area, farmers were being wooed by the extravagant claims being made for a white wheat developed, by selection, by Luther Burbank in California. The wheat was called "Quality" and was claimed to have excellent bread baking characteristics and to yield very well. The only extant grade for white wheat was that for Hard White Fife, into which wheat was last inspected in the 1916/17 crop year.

With the introduction of Quality wheat, four Commercial grades for White Spring wheat were established in 1927 and these remained in use until they were supplanted by a similar series of statutory grades when the Canada Grain Act was revised in 1930. However, the revision listed only three statutory grades (the fourth grade was not added until 1939). Inspections of White Spring wheat peaked at 1.9 million bushels in the 1928/29 crop year, but were under 200,000 bushels by 1934/35.

During the first fifty years we were feeling our way, at first imitating the Americans but soon striking off in new directions because of our different circumstances. Features in which we differed from the approach taken in the U.S., and which resulted in our grades having a universally recognized quality superiority to the corresponding U.S. grades, were: the decision to preserve the enhancement of quality resulting from the blending of parcels of the same grade; the setting of export standards; the decision to export only clean grain, and to clean it in the terminals; and the use of commercial grades to deal with new types of wheat or special varieties prior to the establishment of statutory grades. (In 1926 U.S.

studies indicated that No. 3 Manitoba Northern was normally superior to U.S. No. 1 Dark Northern spring[7]). Our great success in achieving the No. 1 position amongst wheat exporters in the middle 1920s gave us a feeling of confidence that the approach we had taken was correct. But the problems of the 1930s led to pressures, especially from the grain trade, to opt for a cheap product to sell on world markets rather than the "Rolls Royce" which we were offering. By that time, however, the guardianship over the "Rolls Royce" quality was firmly established in the hands of the Associate Committee on Grain Research of the National Research Council and the Western Standards Board of the Board of Grain Commissioners, who steadfastly refused to give in to an Americanization of our grading and handling system.

References:

1. Sessional Papers, Department of Internal Revenue, Ottawa, 1885-1901.
2. Sessional Papers (No. 10), Department of Trade and Commerce, Ottawa, 1901-1917.
3. Report on the Grain Trade of Canada, Dominion Bureau of Statistics, Ottawa, 1918-1935.
4. 54-55 Vict. Ch. 48 (1891).
5. 62-63 Vict. Ch. 25 (1899).
6. Revised Statutes of Canada, Chapter 85 (1906).
7. Wheat Studies, Vol III, Food Research Institute, Stanford University, 1926, p. 11.

PART 3

THE SECOND PERIOD IN WESTERN CANADA: 1936-1981

CHAPTER 14

PREDOMINANT EVENTS AND TRENDS

The year 1935 conveniently divides this study into two halves. It marks the beginning of an era of substantially increased control of the grain handling system, with the federal Government taking two important actions: it finally removed Garnet wheat from the top three grades of Western Canadian spring wheat, and it established the Canadian Wheat Board.

During the late 1920s and early 1930s there was evidence that our major wheat export markets were sensitive to the intrinsic quality of our top grades of wheat, and that to protect our position we would have to exercise very tight control over the varieties that were going to be allowed into those grades. The days when Red Fife or Marquis would constitute 90% of the Western wheat crop were over, and it seemed certain that no one variety could possibly resist leaf rust, stem rust, drought, sawfly, and bunt, and also mature early. The challenge for plant breeders was to produce new varieties which would resist at least some of these diseases, mature early, and also be "equal in quality to Marquis."

When the Canadian Wheat Board was formed in 1935, nobody envisaged the degree of control it would eventually have over western Canadian agriculture. In 1935 the Board functioned simply as an alternative marketing route to that offered by the wheat pools and private elevator companies. But by 1943 the Government had authorized the Canadian Wheat Board to become a monopoly wheat marketing agency, and from then on the whole face of grain marketing in Western Canada changed radically. (Originally this drastic step was instigated as a war-time exigency, but it proved so popular with wheat producers in Western Canada that it was retained after the war and also given control over barley and oats.) The cash and futures markets for wheat were closed down on the Winnipeg Grain Exchange, and prices were fixed once daily by the Board.

A substitute for the hedging role played by the former futures market was sought later, initially by negotiating an agreement with the U.K. which fixed wheat prices for the immediate post-war period, and subsequently by negotiating an International Wheat Agreement (I.W.A.) which limited price fluctuations to within certain limits and was in effect from August 1949 until July 31, 1967. These agreements brought a remarkable period of price stability into the market and throughout most of this time Canada exported more wheat to the signatories of the agreements than any other country.

The middle 1960s, however, saw Canada's predominant role as a wheat supplier begin to decline. The United States had increased wheat production markedly following the second world war and early in the post-war era its overall exports of wheat exceeded those of Canada. These exports were achieved largely through Public Law 480, which was a measure authorizing Congress to allocate vast sums of money to finance aid and "give away" programs. By the 1965/66 crop year the U.S. became, for the first time, the major exporter under the I.W.A. and maintained this position under the subsequent International Grains Arrangement (I.G.A.). Neither the

I.G.A. nor the I.W.A. of 1971-1974, had price provisions, and in both 1970/71 and 1971/72 Canada ranked third, behind Australia, in sales under the agreement. Yet, despite the absence of pricing provisions in the agreements operative since 1967, the Wheat Board has managed to market an average of 91% of Western Canadian wheat production over the period 1971-1980, a significantly higher percentage than at any time since the turn of the century.

The wheat grading system changed very little during the 1936-1970 period in Western Canada's grain growing history. The previous measures, designed to ensure a high quality product throughout the system, were retained and improved technology streamlined the system and increased its efficiency. Through much of this period the question of grading protein content continued to surface. Ultimately, in 1970, the revised Canada Grain Act authorized the top grades of wheat to be segregated by protein content on arrival at terminal elevators, and this was done with No. 1 C.W.R.S. in 1971 and No. 2 C.W.R.S. in 1972. (C.W.R.S. = Canada Western Red Spring.) Thus the remaining source of variability within the grades was finally eliminated and Canadian wheat became the most uniform wheat ever offered in the world market.

CHAPTER 15

THE GARNET PROBLEM: PHASE TWO

The legislation of 1934 (which became effective on August 1, 1935) did not deal very thoroughly with the Garnet problem. Although it precluded Garnet wheat from being graded into No. 1 and 2 Manitoba Northern, and provided for two grades of Garnet wheat (No. 1 and No. 2 C.W.), it simply transferred the problem farther down the line. The price set by the market for the new No. 1 Garnet grade was at the same level as the No. 3 Manitoba Northern grade, which resulted in country elevator agents in areas where not much Garnet was grown simply grading the best of it into No. 3 Northern.

The improvement in No. 2 Northern was indeed remarkable, and agitation began for the same improvement in the now heavily contaminated No. 3 Northern grade. Eventually, in 1938, the government passed Bill 27 creating the grade of No. 3 C.W. Garnet and precluding the Garnet variety from both No. 3 and No. 4 Northern. And there the matter was to rest until after the war.

The effect was almost immediate. In the 1938/39 crop year 21.7 million bushels of Garnet wheat had been inspected; but in subsequent years the amount dropped rapidly until 1942/43, when it was only 140,000 bushels. Garnet wheat continued to be grown for as long as the Garnet grades persisted (i.e. until 1971), but inspections never again exceeded 5.2 million bushels in a single crop year. Farmers turned instead to a relatively new variety, Red Bobs, or to one of its sister selections, Early Triumph, developed by Western Canada's most prolific producer-plant selector, Seeger Wheeler. These varieties matured almost as early as Garnet, yielded well in Alberta and, for the moment at least, graded into the top grades. Significantly, in 1938 the percentage of Red Bobs in No. 3 Northern cargoes from Pacific ports reached 58%, up from 7% the previous year[1], and as high as 80% for No. 2 Northern.

The Commercial grade of No. 4 C.W. Garnet was established for the beginning of the 1954-55 crop year. This was to be the last in the slow progression of grade changes involving Garnet wheat, and the last of the many grades established over the years to help the farmer. Twenty-three years earlier, in the fall of 1931, the Western Standards Board had called for the establishment of three Garnet grades and the exclusion of Garnet wheat from all Manitoba Northern grades above No. 4. This change was not legislated; had it been, it is likely that producers would have abandoned Garnet in favor of Red Bobs much earlier than they did. Instead, excluding Garnet from the Manitoba grades in piecemeal fashion kept Garnet alive for much longer than necessary.

One of the problems was the pricing of the Garnet grades by the market. No. 1 and 2 C.W. Garnet were priced at the same levels as No. 3 and 4 Manitoba Northern. A producer who grew No. 3 C.W. Garnet would try to obtain a better deal at the elevator by demanding a No. 4 Manitoba Northern grade for it. It was to prevent this from occurring that Garnet was eventually excluded from No. 4 Manitoba Northern in the 1938 legislation.

Garnet had a brief flurry in the 1955-56 crop year. In 1954 the durum crop had been hit hard by Race 15B stem rust, both in in Canada and the U.S., creating a severe shortage of Durum wheat on world markets. In the search for substitutes for Durum, the scientists at the Grain Research Laboratory had pointed out that the characteristics which made Garnet undesirable for flour milling and bread baking made it an excellent substitute for Durum for semolina milling and pasta or couscous production. The idea was quickly accepted by the European Durum millers and suddenly the price of Garnet soared: in 1955-56 the initial Wheat Board price for No. 1 C.W. Garnet was 10 cents above that for No. 1 Manitoba Northern. This situation lasted for only one year, however; in 1956-57 No. 1 C.W. Garnet was again below the price of No. 4 Manitoba Northern and it remained there until Garnet grades were eliminated in 1971.

The Garnet problem was perhaps the most serious and costly that the Canadian wheat production and grading system has endured since its inception. It was serious because of the volume of Garnet grown and the very slow reaction of the system to rectify the error which allowed it into the "Manitoba" grades, and costly because it damaged the reputation of the top grades of Canadian wheat in world markets. Using J.G.Carl Fraser's data[2] for percentage of Garnet wheat in cargoes, and the Dominion Bureau of Statistics' figures on exports by grade, one can estimate that over 64 million bushels of Garnet were marketed from a total of 310 million bushels in the 1932/33 crop year, which was more than 20% of farmers' deliveries. Most of this was in shipments of No. 2 and No. 3 Northern from the Pacific coast, which contributed to serious variability in the quality of shipments, not only from cargo to cargo but also between cargoes from the Pacific and Atlantic ports.

The problem was compounded by the fact that Garnet was grown predominantly in areas which normally produced low protein wheat. Prior to the 1934 legislation, the majority of Garnet was being graded as No. 2 Northern (until 1935 it was precluded only from No. 1 Manitoba Hard and No. 1 Manitoba Northern), which had decidedly lowered the protein content of the grade. During the years 1930 to 1934, for example, the protein content of the grades each year were as shown in Table 2.

TABLE 2

PROTEIN CONTENT OF "MANITOBA" GRADES, 1930-34

	No. 1 Hard	No. 1 Northern	No. 2 Northern	No. 3 Northern
1930	14.2	13.8	12.5	12.4
1931	14.6	14.4	13.2	13.0
1932	14.3	14.3	13.4	14.0
1933	14.4	14.2	13.4	13.8
1934	14.5	14.4	13.7	13.7
Mean:	14.4	14.2	13.2	13.4

Regardless of the mean protein for each crop, the No. 1 Hard and No. 1 Northern grades were consistently high in protein and showed very little year-to-year variation. No. 2 Northern, on the other hand, showed a protein level which was consistently below that of the higher grades and often less than No. 3 Northern.

After the three Garnet grades were established in 1938, data on their average protein content over ten years shows them to be 2% lower in protein than grades 1, 2, & 3 Northern.[3] Thus overseas buyers receiving a shipment of No. 2 Northern containing 85% Garnet from a Canadian Pacific port would find it very different from a similar cargo containing only 15% Garnet from an Atlantic port. Throughout the 1930s there were allegations from U.K. buyers that the standard of Canadian grading was much lower than it had been. In those days most millers did not have laboratories and so wheat was judged on the quality of the flour (i.e. how it performed in the bakery), and sometimes the flour was found to be wanting in terms of the strength normally associated with Canadian Wheat. So although the physical standard for No. 2 and No. 3 Northern had not changed from 1927 to 1938, in a very real sense the grading in Canada was perceived to have deteriorated significantly through the inclusion of Garnet wheat in the Northern grades.

References:

1. 2 Geo. VI Ch. 5 (1938).
2. J. G. Carl Fraser, "The Varietal Composition of Canadian Export Wheat, 1926-1946", Scientific Agriculture, 29, 1949, p. 122.
3. Annual Reports, Grain Research Laboratory, 1939-1948. Ottawa, King's Printer.

CHAPTER 16

TIDYING UP THE GRADES

In 1939 attention was turned to general housekeeping and legislation was introduced which saw a series of relatively minor changes to some of the more recently introduced grades of wheat[1]. For several years there had been considerable interest in growing sufficient soft wheat to provide for the needs of Western Canadian mills, and there had even been talk of developing an export market for soft wheat in the far east, especially to China. For a while it was hoped that low protein white wheats could be successfully grown in British Columbia and in the irrigated areas of Southern Alberta, and so Commercial grades for White Spring wheat had been set in 1927 and three statutory grades had been established in 1930. Although very little White Spring wheat was grown during the 1930s, a fourth statutory grade was added in 1939 which had no minimum for vitreous kernels; previously such soft wheat had been lost through being graded into the lower grades of mixed wheat.

Durum wheat had been finding commercial markets during the 1930s with prices often exceeding those for the Northern grades. The Durum grades had been rather loosely defined when they first were made statutory in 1925, so the percentages of hard vitreous kernels required in the higher grades was now tightened up. No. 1 and No. 2 C. W. Amber Durum were each increased by 5% in their vitreous requirement, and No. 3 C. W. Amber Durum by 10%. This resulted in No. 3 C. W. A. D. having a minimum of 40% hard vitreous kernels, with no minimum requirement for No. 4 C.W.A.D.

Similar changes were made to the three Garnet grades, each being raised by 10%: No. 1 C.W. Garnet now required 75% hard vitreous, No. 2 C.W. Garnet 60%, and No. 3 C.W. Garnet, 35%.

These increases were deemed important because at that time the principal grade-determining factors for the statutory grades were bushel weight and percentage of hard red vitreous kernels. The latter was also a measure of soundness and seemed to give a better prediction of baking quality. Protein was also considered to be important and there was known to be a positive correlation between protein and percentage of hard red vitreous kernels, although the protein test measured only the quantity of protein, not the quality.

Changes to the Manitoba Northern grades reduced the minimum bushel weight of No. 4 Manitoba Northern by one pound (to 56 pounds) and eliminated the previous "alternative" No. 4 Manitoba Northern grade by establishing a statutory grade of No. 4 Special with a minimum bushel weight of 53 pounds. This grade was to accommodate sound wheat of low bushel weight resulting from rust or drought. The basis for these changes was a study undertaken by the Associate Committee on Grain Research on the effect of stem rust on the milling and baking quality of wheat[2]. The study indicated that, whereas modest rust infection does not affect bushel weight, kernel weight, or grade, severe rust infection markedly affects all three factors. Baking quality is relatively unaffected even by severe rust, although the color of the flour is yellower and flour yield drops considerably once kernel weights fall below 25 grams per 1,000 kernels.

The Mixed Wheat grades were modified to include minimum bushel weights and a described standard of quality in No. 1, 3, and 5 C.W. Mixed Wheat. Previously the criterion had been "equal to No. 3 in overall quality" (for grades 1, 3 and 5 C.W.) and "poorer than No. 3" (for grades 2, 4 and 6 C.W.).

Throughout the 1930s the Associate Committee on Grain Research conducted a landmark series of investigations into the impact of grading factors on the milling and baking quality of wheat. They also studied the effects of weather and harvesting practices on the grades, and investigated any factor which conceivably might affect the soundness of the wheat or its milling and baking quality. Weathering, storage at high moisture levels, frost damage, drying, and immaturity were typical topics, the results of which were published in a remarkable series of papers. One of the early papers noted:

> In the Canadian Grading system, weight per bushel and percentage of hard vitreous kernels are the chief factors used in assigning the statutory grades, while the relative amounts of the various classes of damage present in the samples are paramount in deciding the commercial grades...[3]

The investigations generally confirmed that the system of grading provided a relevant measure of soundness, or the lack of it, and that the bushel weight/HRV kernel criteria could be extended to the commercial grades as well. (HRV = hard, red, vitreous.) The studies also showed that when the percentage of hard red vitreous was substituted for the percentage of sound kernels, higher correlations were obtained with milling and baking quality.

While confirming the validity of the grading system, the studies yielded evidence that the range of variability within grades was excessive and that this was a result of the wide variations in protein content within grades. This led to the 1932 conclusion that:

> The ideal grading system, apart from an actual determination of milling and baking quality, would appear to be a primary subdivision into wide groups on the basis of weight per measured bushel and percentage of hard red vitreous kernels, followed by subclassification within each group on the basis of protein.[4]

This is the system that was eventually implemented in 1971 and 1972.

References:

1. 3 Geo. VI, Ch. 36.
2. F. J. Greaney, J. C. Woodward, and A.G.O. Whiteside, "Effect of Stem Rust on Milling and Baking Quality", Scientific Agriculture, 22, 1941, p. 40-60.
3. W. F. Geddes, J.G. Malloch, and R. K. Larmour, "The Milling and Baking Quality of Frosted Wheat of the 1928 Crop", Canadian Journal of Research, 6, 1932, p. 119-155.
4. W. F. Geddes, et. al.

CHAPTER 17

THE SECOND WORLD WAR YEARS

No changes were made to the wheat grades during the war years and the few markets which continued to receive Canadian wheat were in no position to complain about quality. In Western Canada attention was focused instead on coping with the problem of storing enormous quantities of wheat in makeshift facilities.

The search for alternative wheats to Marquis and Red Fife was over, achieved by the success in Manitoba and eastern Saskatchewan of the American stem-rust-resistant variety Thatcher, and a succession of new rust-resistant varieties developed by the Rust Laboratory in Winnipeg. Consequently, both Garnet and Durum wheat production declined sharply.

In Alberta, Red Bobs served the majority of producers, with Marquis still hanging on in second place. The major threat now was drought and, in south-eastern Alberta, saw-fly. At the time, the only wheat which was resistant to saw-fly was a Durum variety known as Golden Ball, which had a solid stem, and it continued to be grown in areas where the bread wheats had been severely attacked by saw-flies. Another Durum variety, Pelissier, exhibited a high degree of drought resistance and it also hung on in the dry areas of south-western Saskatchewan. Meanwhile, the plant breeders at the Lethbridge Research Station were working hard to introduce a solid stem into suitable bread wheat varieties, for areas where saw-fly resistance was most urgently needed.

But the main problem now was not production, but rather limiting production and the wheat which piled up in the middle years of the war. The year 1942 saw the highest average wheat yield since 1915: 529 million bushels were produced, of which only 170 million were inspected into commercial channels. In 1943, however, there was a much smaller crop, resulting from lower yields and a reduction in the acreage devoted to wheat. At the same time the United States had a short crop of winter wheat and bought into the Canadian wheat market in a big way, estimating their needs to be as high as 170 million bushels. The Canadian government, in trying to maintain a fair price for Western farmers but faced with prices that would skyrocket on the open market, decided to close the cash and futures markets for wheat at the Winnipeg Grain Exchange and to make the Canadian Wheat Board the exclusive buyer and seller of Canadian wheat. (The government had planned to get out of the wheat business as soon as possible after the war, but producers voted to retain the system and it is still in operation.)

A quota system for deliveries to country elevators was introduced during the war to equalize opportunities for using scarce commercial storage space. It, too, was continued after the war, since it also acted as a production control mechanism: if the Board could not sell a farmer's wheat, then the farmer could not deliver it to an elevator. This had a marked, although indirect, effect on the evolution of the wheat grading system, because there no longer was a direct response system operating between the producer and the overseas market. If a producer decided to grow a certain variety of wheat on certain land, using certain managerial inputs so that he could maximize his profit, he was frustrated because he could not market all that he could produce and was unable to fix the price at a level at which he would be willing to sell his product. The full significance of this restriction has only begun to be appreciated by many producers.

CHAPTER 18

THE PERIOD OF THE POST WAR WHEAT AGREEMENTS: 1946-1967

Durum Production Expands

The wheat surplus disappeared by the end of the war and producers in Western Canada once again turned their energies to production. The acreage of Durum wheat expanded, this time not in the rust area, where durum had initially proved its value, but in the drier areas of southern Saskatchewan and south-eastern Alberta. Since the popular varieties for this new expansion were Pelissier and Golden Ball, neither of which was of top quality, this promptly raised problems. The Associate Committee on Grain Research had been trying for 15 years to establish a reputation for quality in Canadian Durum wheats similar to that which had obtained for Canadian Hard Red Spring wheats. Its interest was sparked by the rapid rise in Durum wheat production during the late 1920s and the 1930s. It had also financed a laboratory which was to assess the quality of Durum varieties and the feasibility of using them for making pasta. By 1945 the laboratory had accumulated considerable data on the varieties currently being grown.

The variety Pelissier had come to North America from North Africa. It had very large kernels and appealed to markets in France and Italy because of its similarity to certain North African Durums which were known to give high yields of coarse semolina. There was considerable debate in Canada, however, because the macaroni products it produced were of a pale yellow color.

In 1930 the variety Mindum was made the standard of quality in grades No. 1 and 2 C.W. Amber Durum (C.W.A.D.), while the remainder of the grades were open to any varieties except the red Durums. Mindum had been the principal variety when Manitoba accounted for most of the Durum wheat production in the 1920s and 1930s, and the quality of the top grades was generally excellent. But now that Pelissier was being grown in increasing quantities in the drier areas of Saskatchewan (where it produced a high grade sample), high percentages of this variety were appearing in the top C.W.A.D. grades. As recent research had shown that Pelissier was not equal in quality to Mindum, the Associate Committee recommended to the Board of Grain Commissioners that Pelissier be graded no higher than No. 3 C.W. Amber Durum. This took effect from August 1, 1946, where it joined Golden Ball, which had been relegated to No. 3 C.W.A.D. in the 1930s, and much of the Manitoba-grown Mindum.

From the 1946 crop until 1955, the principal grade of Durum wheat inspected in Western Canada was No. 3 C.W.A.D. and this was a mixture of high and lower quality varieties. The quality of No. 1 and No. 2 C.W.A.D. wheats was excellent, but they were not harvested in large quantities. Meanwhile, export markets in Europe were opening up again, but with little other than No. 3 and No. 4 C.W.A.D. to offer in the early 1950s it was difficult for Canada to re-establish its quality reputation. To add to the difficulties, a new race of stem rust known as Race 15B appeared in the early 1950s, to which all the currently grown durum varieties except Golden Ball were extremely susceptible. This caused Durum wheat production to hit a post-war low in 1954, following which its production moved farther west, out of the rust area, to where Pelissier and Golden Ball were already well established.

In 1955 No. 3 C.W.A.D. was modified to require it to be composed of varieties equal to Mindum, and a new commercial grade called Extra No. 4 C.W.A.D. was established. Thus Pelissier and Golden Ball now could grade no higher than Extra No. 4 C.W.A.D., regardless of their physical aspects. In the 1955/56 crop year Durum production increased threefold over the previous year and two-thirds of the crop was graded as Extra No. 4 C.W.A.D.

Since early 1952 the Durum grades had been selling at a premium over the hard spring wheat grades, and the premium was continually increasing year by year as North American supplies of Durum were cut down by the Race 15B stem rust. The U.S. was hardest hit because it had nowhere to move Durum production to escape the rust. In Canada production could move west, out of the rust area, which it did very rapidly under the influence of high prices and, often, open quotas. Production of Pelissier decreased steadily from 1955 to 1961, a year of very severe drought. Producers had shifted to Stewart, an American Durum variety licensed in Canada in 1946 which did well in Saskatchewan, and Ramsay, an American "15B-tolerant" variety, to get top dollars for their production. But the drought of 1961 sent them scurrying back to Pelissier, which was the most drought-resistant wheat on the prairies. Finally, in 1963, the first Canadian-developed Durum variety was licensed. This was Stewart 63, a 15B-resistant mutant of Stewart, developed at the University of Saskatchewan, which rapidly became the mainstay of production in Saskatchewan and remained so until the mid 1970s.

The postwar development of the export market for Durum wheat was an early example of the possible consequences of the interpositioning of the Wheat Board between the producer and the export market. The world price of both Durum and spring wheat began to escalate in 1946, with Durum leading the parade, but the Wheat Board chose to keep the price of Durum tied to the price of Red Spring wheat until 1952, when the postwar Durum market mushroomed and the Board was forced to cut the Durum producers in on the premiums that were being obtained. In that year the Board's final payment reflected a Durum premium of 41 cents over Hard Red Spring wheats. It stayed at a premium until 1963, by which time the producers had "got the message" and in that year produced 6 1/2 times more Durum then in 1952.

During the period of the International Wheat Agreements from 1946 to 1967, in most years the Wheat Board rationed Durum wheat to our U.K. and European markets and used it to achieve "tie in" sales of Hard Red Spring wheat. Since it was pooled with the other types of wheat grown in Western Canada, the Board sold Durum under the I.W.A. price structure, when the world price for it was much above the I.W.A. maximum. Thus by "allocating" supplies of Durum to I.W.A. countries at the maximum I.W.A. price, the Wheat Board was giving them a bargain which was used to induce them to purchase Hard Red Spring wheat. Since 1967 Durum has established its own price level, and only in 1969, 1970, and 1978 has the overall return been less than for Hard Red Spring wheat.

In 1978 the Wheat Board finally established a separate pool for Durum wheat, which is now less open to "political" manipulation. Recent exports have been averaging around 70 million bushels a year. There seems little doubt that the early postwar treatment of Durum wheat by the Canadian Wheat Board cost the Durum producers of Western Canada several millions of dollars.

For producers in the wheat growing areas, Durum now represents an alternative to Marquis quality bread wheat. Growing Durum is, for many producers, a speculation. As Durums in the southern prairies yield as well or better in many areas as the quality Red Spring wheats, it is the size of the quota and the ultimate price which are the speculative features. Durum production is cyclical, with over-production ultimately leading to lower prices and smaller quotas, but the system responds rapidly and these periods are usually short. With each new cycle, the overall production and exports hit new highs and it is doubtful if we have yet probed the ultimate potential of the world Durum market.

The New Varieties of Hard Red Spring Wheat

Although Durum wheat was establishing itself as a viable alternative to the production of Marquis-quality bread wheat varieties, it never exceeded 10% of the wheat production in Western Canada. Other existing varieties, plus new varieties being licensed, predominated. In the immediate post-war period, the variety Thatcher had become the new Marquis and was grown on over 50% of the wheat acreage in the prairie provinces. In 1946 two new varieties were licensed: Redman, a rust resistant variety developed for Manitoba and Eastern Saskatchewan, and Rescue, a sawfly resistant variety. In 1947 the variety Saunders was licensed for the area served previously by Garnet, and later by Red Bobs. Saunders was a high quality, early maturing variety which, it was hoped, would displace Red Bobs (Red Bobs was somewhat low in protein and to some extent had continued the problem, created originally by Garnet wheat from Alberta, of low protein cargoes in the top grades shipped from the Pacific coast ports.)

A joint conference of the National Research Council Associate Committees dealing with wheat in Western Canada recommended in 1946 that protein limits be adopted for No. 1 Northern. This followed a proposal by the Associate Committee on Grain Research that low protein wheat be kept out of the statutory grades. The idea was summed up by Dr. Robert Newton, chairman of the Associate Committee on Grain Research and President of the University of Alberta who, in the presidential address to the Royal Society of Canada published in May 1946, concluded with these words:

> Altogether it seems to members of the Associate Committee on Grain Research, a national body of which I have the honour to be chairman, that the time has come to reconsider the permissibility of allowing low protein wheat to go into export grades. Advances in cereal chemistry bid fair to overcome the technical difficulties which faced us at the time of the earlier inquiry (1930), and the comprehensive statistics now available to us on

> yields and protein contents in various districts enable us to assess the probable quantitative effect of any restrictions imposed. The exclusion from the main export grades, No. 1 and No. 2 Northern, of wheat falling below 12.5% protein seems to be desirable and feasible. We must expect local opposition in the regions immediately affected, but it is hoped that considerations of the greatest good to the greatest number will prevail.
>
> These considerations obviously affect the northern limits of wheat production, in the sense that wheat grown beyond the 12 percent line on the northern periphery of our wheat protein maps should be intended for local consumption, either as human food or as stock feed, rather than as an article of commerce...[1]

Although there was a great deal of discussion of the idea, nothing came of it at the time or, indeed, for many years. Meanwhile, following the licensing of the Saunders variety in 1947, the Associate Committee recommended to the Board of Grain Commissioners that Red Bobs was not equal in quality to Marquis, and the Board ruled that from August 1951 Red Bobs would be eligible for grades no higher than No. 3 Northern.

A precedent was set in 1946 with the variety Rescue, which had some overtones of the Garnet incident but fortunately did not have a negative effect on wheat quality. It was licensed because it was resistant to saw-fly, although it was recognized that it was "not equal in quality to Marquis;" yet it could not, on its appearance, be kept out of the top grades of wheat. Since it would be grown only in the South-western prairie region, and would move only to the west coast, it was argued that it would be sufficiently blended with the regular varieties that it would not seriously influence the quality of the grades. In the event this turned out to be the case and no problems could be identified with Rescue during the six years it was in use. In 1952 it was replaced by a high quality variety licensed under the name of Chinook.

The last American Hard Red Spring wheat to be licensed in Canada, a high quality leaf-rust-resistant variety called Lee, was licensed in 1950. In the meantime, Race 15B stem rust was knocking out the durum varieties and also affecting the Hard Red Spring varieties in the rust area. But within two years, in a timely development which saved western Canadian farmers millions of dollars and was equally useful in the U.S., plant breeders at the Winnipeg Rust Laboratory came up with a Race 15B-resistant variety which was licensed as Selkirk in 1953. Through an accelerated development program the breeders managed to get seed into the hands of farmers in the rust area in 1954, so that much of the rust area could be seeded to Selkirk in 1955. The quality of Selkirk was not quite up to that of Thatcher, which it replaced, but it was still approved by the Associate Committee as "equal in quality to Marquis".

Although it was an emergency "stop gap" variety, Selkirk quickly spread throughout the rust area of Western Canada and the spring wheat growing states in the U.S., where it was widely used for some 12 years. Although a superior quality variety named Pembina was licensed in 1959 with somewhat better leaf-rust resistance than Selkirk, it did not significantly out-yield Selkirk and made little impact. It was not until the licensing of Manitou in 1965, and especially Neepawa in 1969, that production of Selkirk petered out.

The variety Park was licensed in 1963 for the areas of Alberta which earlier had been so attracted by the yield and earliness of Garnet, and where producers had subsequently moved to Red Bobs (and then to Saunders when Red Bobs was removed from the top grades). Park had excellent milling and baking quality, matured as early as Garnet, outyielded Saunders, and has since found a secure place in the Alberta crop districts adjacent to the mountains.

For the saw-fly area of south-eastern Alberta and south-western Saskatchewan, the variety Cypress was licensed in 1962 and gave improved quality over Rescue and better yields than Chinook. It remained in use until 1981, when both Rescue and Cypress were de-licensed.

Throughout the 1946-67 period Thatcher remained the major variety, both in Saskatchewan and in Western Canada. The only serious threat to its production was drought, as occurred in 1961. Although the variety Lake had been developed to serve the dryer areas of Saskatchewan, and was licensed in 1954, it never made much headway because Thatcher outperformed it in most years, as did several of the Durum varieties.

Canada Seeks New Markets

The post war period was characterized for 20 years by a search for new markets for wheat. Exports to the U.K. never regained the levels of the 1920s and, while a number of the European countries once again were buying "Manitobas," substantial surpluses which existed in most years inhibited all-out production. The trend in exports was upward over the long haul, but it seemed laboriously slow; indeed, it was not until the 1963/64 crop year that Canada surpassed the export figures for 1928/29 (see Table 3). Production increased gradually, hitting new highs in 1952 and again in 1963 and 1966, forcing producers to add yearly to their on-farm storage capacity.

The breakthrough in the pattern of exports came in two ways: with the extension of short-term credit to the communist countries of eastern Europe, and with the opening up of the Japanese market in the 1950s and the People's Republic of China (P.R.C.) in the 1960s. The increase in farm storage capacity had an added advantage in that wheat supplies were there when the U.S.S.R. or the P.R.C. came into the market on a massive scale. After that it was the logistics of moving the grain that became a limiting factor.

Canada's experience in wheat production and marketing, and unsurpassed technological capability, put us in a good position to manage increased exports. The grading and handling system was in good shape, and the plant breeders were producing a steady stream of improved varieties to enable producers to successfully combat most of the threats to production. So from the mid 1950s the Canadian

	A	B	C	D	E			
	Wheat Prod. West. Canada m. bu.	Western Wheat Inspected (crop yr.) m. bu.	Wheat Exports (crop or fiscal) m. bu.	Wheat Exports to U.K. (crop or fiscal) m. bu.	Total U.K. Wheat Imports m. bu.	$\frac{B}{A}$ %	$\frac{D}{C}$ %	$\frac{D}{E}$ %
1936	204	182	175	124	188	90	71	66
37	157	118	79	55	181	75	70	30
38	336	277	139	76	190	82	55	40
39	494	372	162	113	198	75	70	57
40	514	294	185	160		57	86	
41	296	296	180	129		100	72	
42	529	170	158	116		32	73	
43	268	396	283	88		148	31	
44	392	414	280	120	132	105	43	91
45	295	286	278	124	128	97	45	97
46	393	312	163	126	156	79	77	81
47	320	235	134	122	158	73	91	77
48	356	285	184	129	178	80	70	72
49	341	302	179	111	122	88	62	91
50	427	304	185	78	151	71	42	52
51	529	422	305	109	146	80	36	75
52	678	470	329	102	150	69	31	68
53	604	337	209	66	129	56	32	51
54	305	311	211	89	167	102	42	53
55	497	341	269	97	178	69	36	54
56	551	367	228	80	169	67	35	47
57	371	378	276	90	168	102	33	54
58	372	348	252	87	159	94	34	55
59	430	374	235	80	153	87	34	52
60	498	412	311	79	140	83	25	56
61	260	406	323	74	146	156	23	51
62	546	398	300	78	147	73	26	53
63	703	605	537	79	141	86	15	56
64	578	490	367	70	162	85	19	43
65	632	630	546	70	149	100	13	47
66	807	636	483	68	141	79	14	48
67	574	395	311	62	150	69	20	41
68	629	404	280	56	174	64	20	32
69	652	404	318	53	183	62	17	29
70	312	483	409	65	169	155	16	30
71	510	598	478	47	154	117	10	30
72	513	622	553	44	139	121	8	32
73	574	460	400	46	105	81	12	44
74	465	460	376	58	133	99	15	44
75	599	509	428	44	140	85	10	32
76	835	530	466	52	141	63	11	37
77	691	611	559	56	113	88	10	50
78	752	530	451	48	100	70	11	48
79	609	649	558	50	75	106	9	67
80	657	694	572	52	61	105	9	85
81	876	764	660	50	56	87	8	90

Wheat Board and the Board of Grain Commissioners, often working together, began an extensive market research and development program. This involved bringing missions to Canada to familiarize potential or active customers with our system and sending out technical people to prospective and growing markets all over the world to ascertain their needs and acquaint them with how well we could fill them.

But competition was tough. The Americans had their P.L. 480 program, which often denied us former or potential markets since we could not compete on credit or "giveaway" terms. Australia was increasingly active in the far and middle east, and the Russians, despite their occasional requirements for massive imports, were often very significant exporters to the European countries.

The Increasing Importance of Protein

As the U.S.D.A. struggled to control wheat production and to keep the American surpluses to manageable proportions through exports under the P.L.480 program, they were also having a hard look at how the U.S. could increase exports of high quality wheat. They had only to look north to see that the major limitation affecting the quality of the principal export grades of Canadian wheat was the variability in protein content, both within the grades and from year to year. From 1947 to 1956 the average protein level of the Western Canadian wheat crop fell in a more or less orderly progression from 14% to 12.4%; and then in 1957 it rose abruptly to 14% again and continued to rise over the next seven years until it peaked at 14.9% in 1964. This variability led to grumbling from Canada's steady customers and, in some markets, to outright refusal to buy, if we could not agree to furnish a specified minimum protein level.

The Americans seized on this as a way of making inroads into our quality markets and began to offer their Hard Red Winter wheats at specified protein levels (usually 14%), and later their Dark Northern Spring grades at 13 or 14% protein. They were followed by the Russians, who sorely needed hard currencies and who were opening up the new spring wheat areas in Kasakhstan. The Russians began by offering SKS 14 (Soviet Kasakhstan Spring wheat with 14% protein content) and later SKS 15 to the European market. In the far east, the Australians climbed on the bandwagon by offering their high protein Queensland wheat at 14 and 15% protein. Throughout, the amount of "guaranteed" protein wheats traded was still small compared with total sales of Hard Red Spring and Winter wheats, but for Canadians the handwriting was on the wall.

A strong impetus to this trade came from the decolonialization of Asia and Africa. Many of the tropical and semi-tropical areas of the world had been markets for Canadian and American high protein spring wheat flours, which were needed for their primitive baking conditions. The milling industry in North America was only too willing to supply these flours, since millers in both Canada and the U.S. were readily able to select high protein wheats for their manufacture. But one of the first things that each country did as it gained its independence was to construct one or more flour mills. And then it needed high protein wheat to produce flours that could duplicate those previously imported. The Americans and the Australians were there quickly, offering high protein wheat to them, while the Canadian Wheat Board was limited because it could offer only what was currently available in the grades. During the 1958 to 1964 period, when the average protein levels of Canadian wheat were high, our product proved acceptable; but at other times it did not.

This variability proved quite frustrating, particularly as Canada had begun looking into the possibilities of protein grading as far back as the late 1920s. The Grain Research Laboratory began its surveys in 1927, and by the early 1930s had collected massive amounts of data on the protein content of carlots and cargoes of most of the western wheat. By the mid 1960s Canada had more information on protein in commercial wheat than any country in the world! But our research had gone even further: during the immediate postwar period the Grain Research Laboratory had conducted extensive studies on potential rapid methods for determining protein content. It had also made extensive statistical studies, using the data collected from each year's crop, to devise possible systems for reducing the variability of protein in the grades, or establishing predetermined minimum protein levels for certain grades.

Protein selection was very simple in the U.S., where virtually all of the wheat used by the domestic milling industry was purchased on sample markets located at the major terminals, such as at Minneapolis or Kansas City. Carlots arriving at the market were sampled immediately and protein information was supplied when the sample was offered on the floor of the Grain Exchange. But in Canada the situation was entirely different because we had neither sample markets nor commercial markets; for the producer, the Canadian Wheat Board was the entire "market."

It had been known for many years that certain areas in the southern prairies normally grew high protein wheat and got relatively low yields, while other areas to the north and west normally grew low protein wheat and got higher yields. Consequently the farmers in the southern, dry areas of the Prairies were establishing a high quality level which benefitted the farmers in the more northern areas, but the southern farmers were not reaping the monetary benefit. That is, by accepting wheat at country elevators by grades regardless of protein content, and then blending them within grades at the terminals, the high protein, lower-yielding wheat was making and sustaining the reputation of our wheat in export markets.

The political aspects of limiting the top grades to wheat grown in the southern prairies, or other possible forms of discrimination necessary to achieve higher and more uniform levels of protein, were formidable and no federal government, either Liberal or Conservative, wanted anything to do with it. So the technicians and the scientists were told to "cool it," and this they did for some years. But the data collection and research continued.

The Prospect of Higher Yields

In 1944 Dr. Norman Borlaug, a plant pathologist from Minnesota, undertook an assignment with the Rockefeller Foundation in Mexico with the long-range objective of making Mexico self-sufficient in wheat production. Working first with the indigenous wheat varieties, together with irrigation and fertilizer regimes, he found that the traditional varieties would literally not stand up under such production conditions. What was needed were short, strong-strawed varieties which would not lodge (fall over) under heavy productivity.

He attacked this problem by using the newly developed American variety Gaines, which contained dwarf genes from the Japanese wheat Norin, and succeeded in transferring the gene for dwarf characteristics into the traditional varietal material. This program began to bear fruit in a spectacular way in the early 1960s, with the release of several prodigiously yielding new "semi-dwarf" wheat varieties. His success led to the International Centre for Wheat and Maize Improvement being established in Mexico City in 1960, and the new varieties beginning to spread all over the world. This was the start of the so-called "Green Revolution," for which Borlaug was recognized with the Nobel Peace Prize in 1970.

While private plant breeders had been well-established for many years in Europe, and had been producing hybrid corn varieties in the U.S. since before the war, they had not become involved in wheat breeding in North America. However, parallel with Borlaug's work in Mexico, the means of producing hybrid wheat were being developed by agricultural scientists in several areas in North America. This work caught the imagination of some private companies involved in hybrid corn breeding, who reasoned that hybrid wheat, if it followed the spectacular results obtained with corn, should offer increased yields of from 25 to 50%. So the private breeders rapidly set up programs to produce high-yielding "normal" wheats based on the varieties Borlaug's program was producing, to provide them with a sure-fire base for the development of hybrid wheats.

In the U.S. there was essentially no varietal control in the grading system, and by the mid-1960s the private firms began releasing semi-dwarf varieties for production in the spring wheat areas of the U.S. At least one company set up a branch in Canada and attempted to do the same here, but not without problems. Borlaug had followed a shotgun approach in his program without regard for the quality of the semi-dwarfs he was producing; that, he reasoned, could come later. The result was that his varieties ran the complete gamut from weak, low-protein types to extremely strong, higher-protein varieties.

The private breeders were chiefly concerned with yield and most did not have facilities for monitoring milling and baking quality. Consequently they ran head on into the Canadian "Establishment", who told them that if they wished their varieties to be considered for licensing in Canada (without which they could not sell seed) they must submit them to the same three-year testing program required of all new varieties. The program required that, as well as showing superior agronomic performance, their varieties had to pass the test of being "equal in quality to Marquis." While some of the varieties which had been released in the U.S. showed some evidence of superior agronomic performance, when subjected to the official testing procedures in Canada none of them met this requirement, and none were licensed in Canada.

Canadian plant breeders were fully aware of the potential offered by the semi-dwarfs as breeding material, and so most of Borlaug's varieties were tested in the regular variety trials in Canada. But for several reasons none were found to be acceptable for licensing. Farmers in Western Canada, however, became aware of the tales of high yields from their counterparts south of the border and created considerable agitation for relaxing our rigid quality standards and going all out on production to "feed the starving masses of the world" (which seemed to be the plan in the U.S.).

There was one variety from Borlaug's program which was widely adapted all over the world and out-yielded most wheats anywhere it was grown. This was Pitic 62, a semi-hard variety of low protein which was neither a soft wheat nor a hard wheat. It could be used for animal feed and it was quite distinguishable in kernel characteristics from our Marquis quality wheats. Acceding to pressure from both Eastern and Western farmers, the Canada Department of Agriculture licensed Pitic 62 in 1969, with the proviso that it would be graded into No. 6 Wheat by the Board of Grain Commissioners.

Meanwhile work on hybrid wheat development continued in both the U.S. and Canada with U.S. plant breeders devoting most of their efforts to winter wheats. Early work had suggested that the degree of hybrid vigor that could be expected from wheat was considerably less than had been shown by corn, and that the production of hybrids was less efficient and accordingly production costs were going to be high. Average yields in many U.S. winter wheat areas were of the order of 35-40 bushels per acre, and it was estimated that hybrids might raise this an additional 10-12 bushels, to 45-50 bushels per acre. This, it was reasoned, would be more than enough to cover the high cost of the hybrid seed. (The grain produced from hybrid seed cannot be used as seed for the following crop; new seed must be purchased each year.) In the spring wheat zones, however, average yields were about 20-25 bushels per acre. Additionally, the seed set was less efficient in the more northerly climates, which would further increase the cost of producing the hybrid seed. After twenty years, the expectations still have not been realized for hybrid winter wheat, and the prospects for hybrid spring wheat appear to be even more remote.

It was advocated by some people in the 1960s that greatly increased yields of spring wheat could be achieved in Western Canada if we would only give up our Marquis standard of quality. This prophesy has largely turned out to be an illusion.

In new variety trials conducted each year in Western Canada, Marquis wheat is grown alongside both the current standard varieties and the new varieties under test. From the data obtained in these trials some idea can be gained of the environmental compared with the genetic effects on yield. Tests made over a number of years indicate that the variety Neepawa, which currently is grown on some 56% of the wheat acreage in Western Canada, yields 16% higher than Marquis, which dominated the acreage from 1914 to 1940.

But in each case this intrinsic yield must also be examined with other factors in mind, such as a variety's ability to sustain long-term protection against potential environmental hazards such as rust and drought. (These abilities are strong factors in the variety Neepawa.) From Marquis, released in 1909, to the present day wheats there has been a continuing succession of varieties which have given better protection against environmental hazards than provided by Marquis, but which have not represented a particularly significant improvement in genetic yielding ability.

Most current evidence suggests that considerably greater yield increases can still be obtained in Western Canada through improved husbandry and management practices rather than from genetic engineering (i.e. the development of higher yielding varieties). Although water is a limiting factor in many parts of the southern prairies, current varieties yield remarkably well even with limited rainfall. Undoubtedly, better water conservation and utilization regimes would increase average yields in many years, as has been seen from the results achieved by some producers who practice good management techniques. How important these can be is perhaps best illustrated by data from the yearly variety tests which are conducted at experimental stations throughout Western Canada.

Over the past 13 years the average yield of Hard Red Spring wheat at 18 test locations in Western Canada has been 43.7 bushels per acre. During this same period the average yield on adjacent commercial wheat acreage has been 25.9 bushels per acre. There is a close correlation between the overall mean yield at the experimental farm test locations and annual estimates of the mean wheat yield for Western Canada, as shown in figure 1, confirming that the environmental effects are similar for both. At the experimental stations, the plots are subjected to the same environment as the surrounding area and the difference between the means represents largely the difference between average management practices and optimum practice. This suggests that by proper application of known management regimes an increase in average yield of close to 70% is possible in Western Canada, using present varieties. It is perhaps too much to expect that the full 70% will ever be achieved, but it is not unrealistic to anticipate that under circumstances where producers are consciously aiming for maximum yields, increases of 50% should be possible.

Many producers tend to discount the evidence from the Research Station plots, saying that such husbandry and management practices could never be applied on a practical basis. Many are unaware that there are also a number of producers who often exceed the yields achieved by their nearest Research Station. Good management is largely a question of being well-informed and prepared to expend time and money on the necessary inputs.

The major roadblock in using the information currently available to achieve higher yields has been--and still is--the psychological reluctance on the part of producers to make consistent application of the information every year, caused by their failure in any one year to achieve the expected results. On the other hand, the experimental station plots are treated the same way each year: the optimum inputs are used every year, regardless of whether it seems to be a good bet or not! Each year the experimental stations "go for broke." Some years the optimum inputs achieve mediocre yields as a result of adverse environmental conditions, but some years the use of the optimum inputs interacts in a spectacular way with the environment to produce very high yields.

The cyclical nature of yield patterns in Western Canada largely reflects weather conditions and has a 13-year periodicity which is remarkably consistent. When this is taken into account by plotting a 13-year running mean for yields in Western Canada, something closely approaching a straight line can be observed, which indicates that yields since the 1930s have been increasing steadily and are now double what they were then (see Figure 2). The cyclical nature of the yield pattern means that producers in Western Canada who are seeking to maximize yields must be prepared to view a 13-year period when assessing results achieved by consistent application of the optimum husbandry and management practices.

The Winter Wheat Option

The most obvious way to achieve higher wheat yields in the prairie region of Western Canada is to grow winter wheat. All over the world where winter wheats can survive the winter season, winter wheat yields are higher than spring wheat yields. As a result, spring wheats are normally grown only where the winter wheat option is not viable.

The total area of Western Canada where winter wheats might be grown on a regular basis has been estimated at no more than one million acres, mostly in southern Alberta and the south-western corner of Saskatchewan. As noted earlier, the experience of the early settlers who tried growing winter wheat in this region was not good, undoubtedly because they were using unsuitable varieties. But in 1908, and again in 1911, production reached 2.5 million bushels using more suitable American varieties of winter wheat, representing plantings of perhaps 125,000-150,000 acres. Following 1911, however, production fell below one million bushels and remained low until the end of the second world war. In 1946, and again in 1948, it reached 3 million bushels, and then again fell below one million.

There was a brief flurry in the mid-1950s, but the acreage potential did not really begin to be exploited until 1963 when production approached 6 million bushels, and again in 1966 when it topped 10 million. The impetus was the development of a good winter hardy variety, Winalta, the quality of which was similar to that of the Marquis type spring wheats. There is no quality standard in the winter wheat grades, but producers now felt that they might get a better price for their winter wheat since its intrinsic quality was so high. It was not to be, however, because winter wheat on average has two percent less protein than the corresponding spring wheat and so rarely achieves price parity. For the next 12 years production lagged, until in the early 1980s when it again approached 10 million bushels annually. The increase was triggered by the release of Norstar, a new variety which showed superior winter hardiness.

The limiting effect of moisture on winter wheat production has been demonstrated recently by long-term yield data from the Lethbridge Research Station, where the winter wheat variety trials are grown under both irrigation and dry land conditions. During the dry summer of 1973, winter wheat on dry land at Lethbridge yielded 68% more than the spring wheat, but under irrigation it yielded 324% more than the spring wheat and 152% more than the corresponding dry land winter wheat.

Figure 3 shows average yields at Lethbridge over the past 12 years for Hard Red Winter wheat grown under irrigation, Hard Red Winter wheat grown under dry-land conditions, and Hard Red Spring wheat grown under dry-land conditions. Apart from 1970, winter

Figure 1

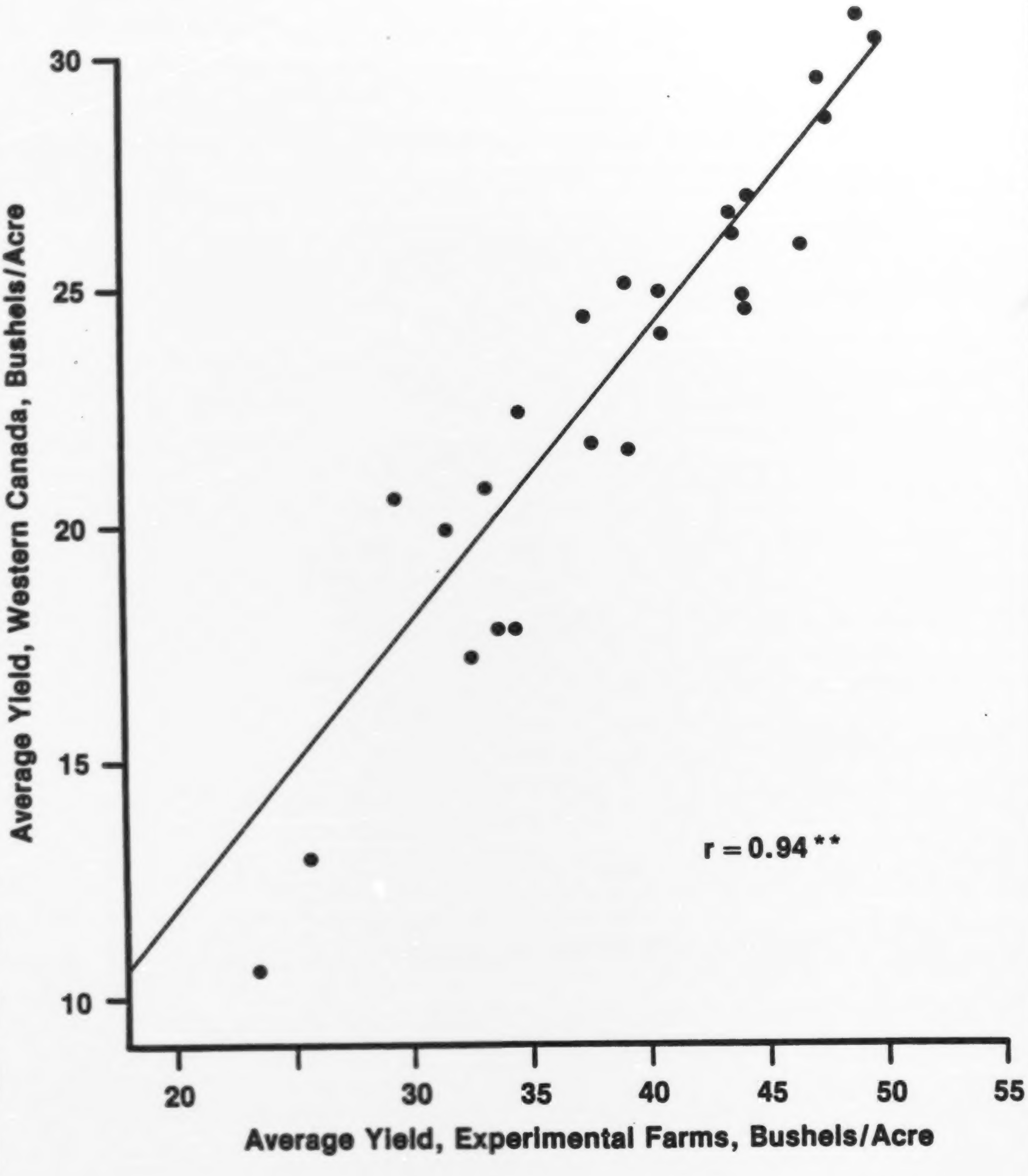
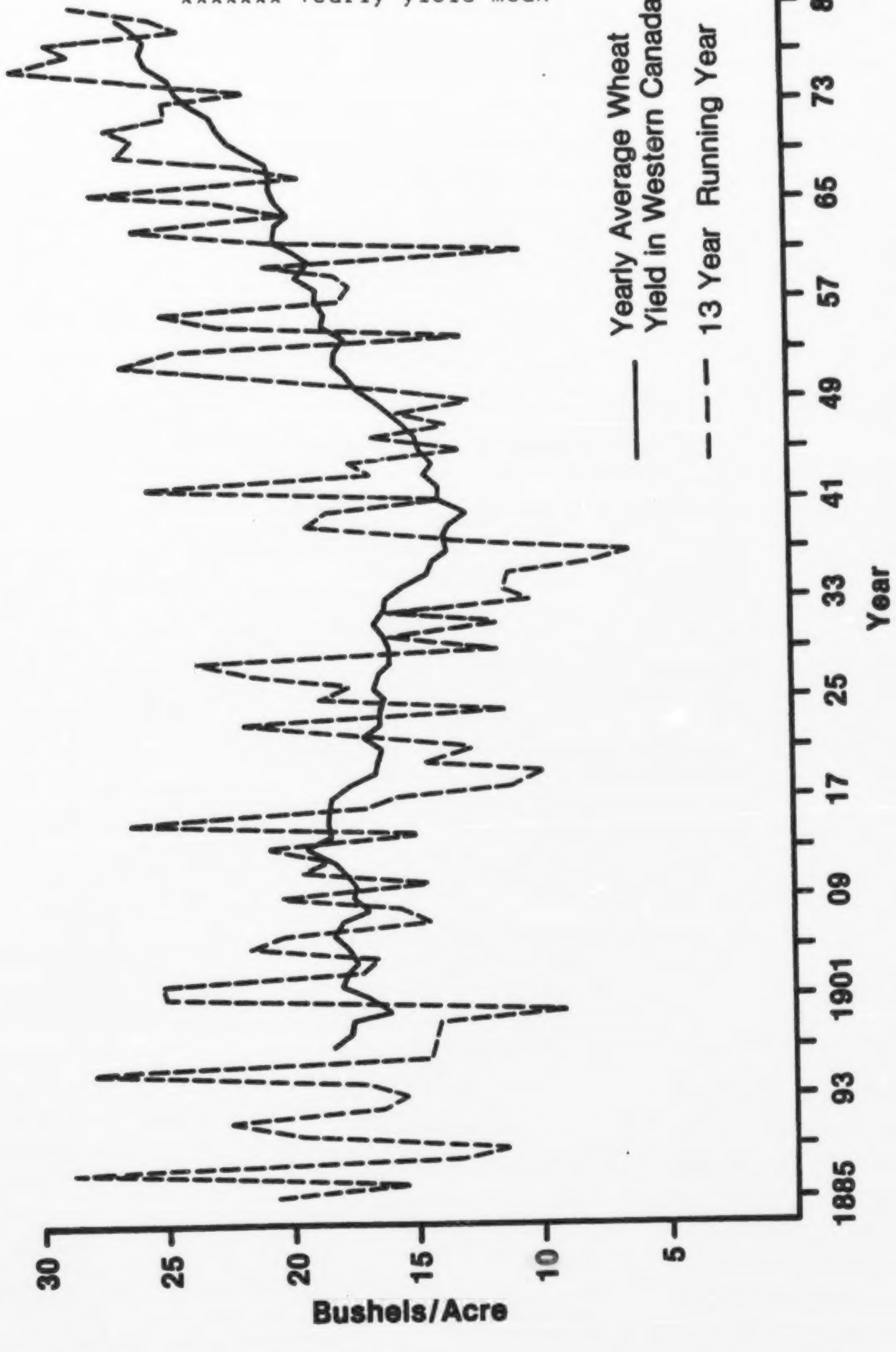

30
25
20
15
10
Average Yield, Western Canada, Bushels/Acre
20
30
35
40
45
50
55
Average Yield, Experimental Farms, Bushels/Acre
r = 0.94**

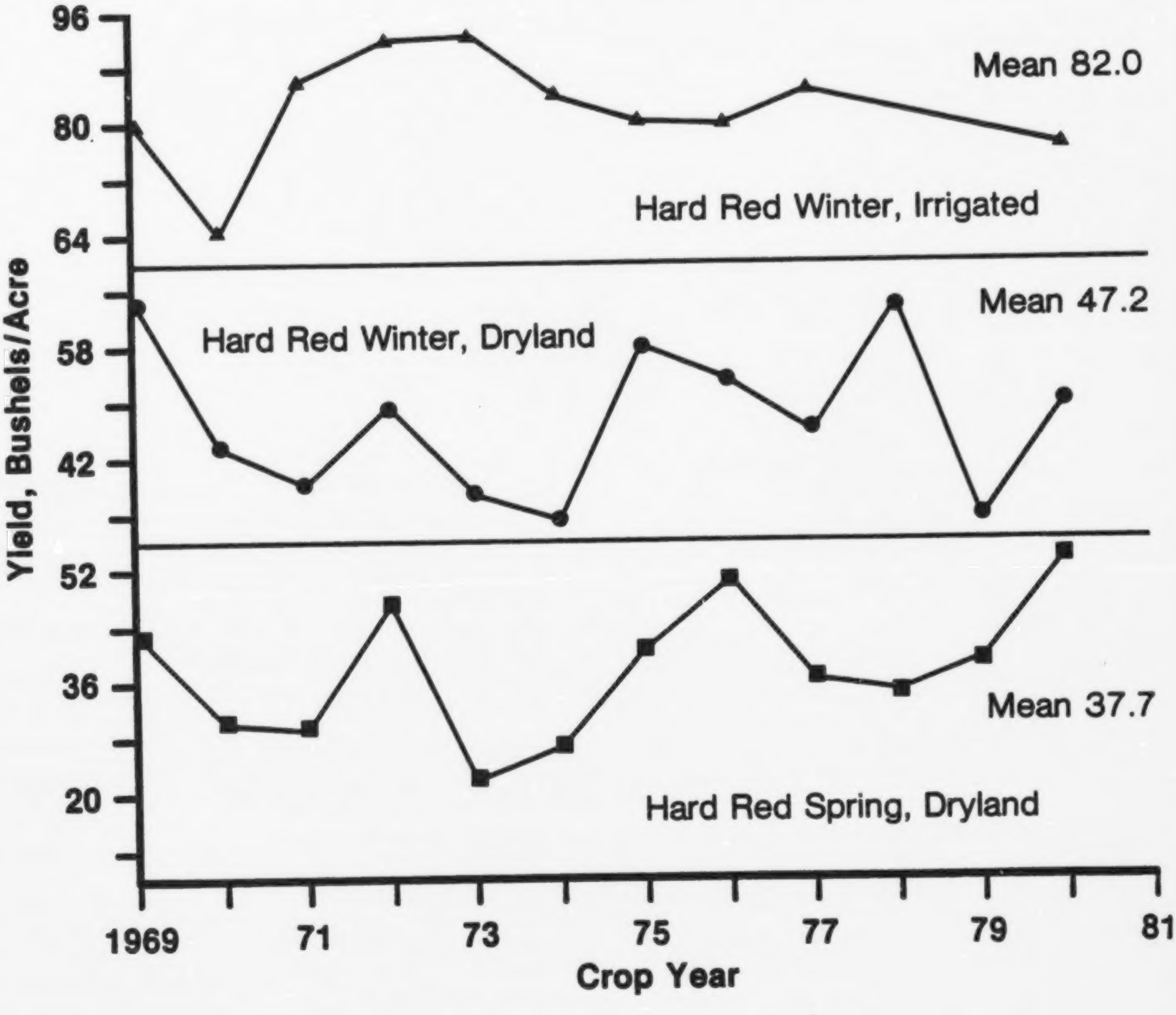
Figure 2

Yield of Wheat in Western Canada
1885 - 1981
.... 13 Year running mean
xxxxxxx Yearly yield mean



Fiqure 3

Comparison of average yields of Hard Red Winter wheat under irrigation, Hard Red Winter wheat on dryland and Hard Red Spring wheat on dryland at Lethbridqe for crops of 1969-1980



wheat grown under irrigation shows remarkable yield stability with a mean of 84 bushels per acre and a standard deviation of 5.4 bushels. Both winter and spring wheats grown under normal dry-land conditions exhibit a much wider variability from year to year, with winter wheat showing an average yield advantage of 15%. Equally interesting is the 74% yield advantage shown for winter wheat grown under irrigation as compared with the same wheat grown under dry-land conditions, indicating the extent to which winter wheat yields are limited by available moisture during the ripening period.

The Conacher Study of Grain Handling and Grading

From the early 1960's there had been rumblings about the efficiency of Canada's grading and handling system, and both Liberal and Conservative ministers had promised to investigate whether improvements were necessary. Consequently in 1965 the Board of Grain Commissioners authorized that an extensive study be conducted by M.J. Conacher, a former chief grain inspector who was then a special assistant to the Board. His report was published in October 1967 and recommended:

1. Abolishing the Garnet grades, the White Spring wheat grades, and No. 1 Manitoba Hard grade.
2. Shifting a number of the lower grades of the various classes from statutory to commercial grades.
3. Changing some of the tolerances within the grades.

Although the proposals would have lowered the number of grades of western wheat, the recommended changes were neither sweeping nor revolutionary and totally in line with the conservative approach to change which had characterized the previous fifty years of evolution. However, no immediate action was taken on the recommendations, nor did the study have a significant impact on another task force of the Board of Grain Commissioners which shortly was to undertake a major revision of the Canada Grain Act.

References:

1. Robert Newton, "Northern Limits of Wheat Production," Transactions of the Royal Society of Canada, 39, 1945, p. 1-19.

CHAPTER 19

THE CURRENT ERA: 1968-1981

Updating the Canada Grain Act

The Canada Grain Act had last been substantially revised in 1930, and now both the government of the day and the Board of Grain Commissioners were convinced that it needed a facelift. To this end the Board of Grain Commissioners appointed a task force to study what revisions should be made.

One of the desired revisions was to remove the requirement that any changes to the statutory grades must be made through an act of Parliament. The last 15 years of the 19th century had been a most active and experimental period, during which changes were made by Order-in-Council. But in 1899 Parliament wished to add stability to the evolving system and felt that this could best be achieved by requiring that Parliament make any changes in the statutory grades. This system did indeed create the desired stability over the next 70 years but it was not without its drawbacks, as the slow response of Parliament to the Garnet problem had indicated. Now, the Board felt that greater flexibility in the administration of the grading system was needed to allow a more rapid response to the changing environment in world markets.

A revolutionary change that the Board wished to introduce was protein segregation in the top grades of Hard Red Spring wheat. In preparation for this move, the Board's Grain Research Laboratory studied the annual protein surveys from 1927 to 1968 and published the results in 1969[1], thus providing a wealth of material upon which to base rational decisions. The report included a number of exclusion exercises, similar to those proposed from time to time in the past, in which wheat from certain areas could be excluded from the mainstream because of low protein content.

A second study, using the University of Manitoba's large computer, involved exercises in the logistics of handling carlots of wheat. Since 1939 the Grain Research Laboratory had been collecting data every year on the protein content of carlots of wheat moving from country elevators to domestic consumption or to export positions. This information was programmed into the computer to simulate ways in which the different levels of protein could be segregated as the carlots were unloaded at terminal elevators.

The Board of Grain Commissioners, the grain trade, the Canadian Wheat Board, and the government all agreed that Canada must move into some system of protein segregation, and the Grain Commission proposed that the statutory grades for Hard Red Spring wheat be reduced to three grades plus a feed wheat grade, in place of the eleven grades then currently in use. The top two of these consolidated grades would then be segregated according to protein content.

The new legislation in the revised Canada Grain Act of 1970[2] introduced many changes, the more important of which are described below.

1. The Governor in Council could amend Schedule I (the Statutory Grades) on the recommendation of

the Grain Commission, providing that eight months notice was given before implementation (although provision was also made for earlier implementation in special circumstances).

2. The name of the Board of Grain Commissioners for Canada was changed to the "Canadian Grain Commission."

3. The existing schedule of statutory grades was transferred intact into the new Act except that the No. 1 Manitoba Hard grade was eliminated (it had not been in active use for many years).

4. The definition of the Export Standard samples was changed so that the samples were now to "... represent as accurately as possible the average of grain of that grade received at any or all elevators at any or all inspection points." The previous definition, which had been current since 1930, had called for only three parts of the average estimated for the grade, plus one part of the standard (which represented the minimum for the grade).

5. Provision was made for the use of protein as a criterion in setting grades of grain, as well as other non-visually determined criteria of quality.

6. For the first time the policy was spelled out that "...where grain of any kind is of a variety produced from seed of a variety that is not prescribed under the Seeds Act for sale in or importation into Canada, no person shall, except with the permission of the Commission, assign to that grain a grade that is higher than the lowest grade set out in Schedule I for that kind of grain." This policy had prevailed previously by regulation under the Canada Grain Act.

7. All the essential features of the grading and handling system were retained (such as prohibition of mixing in terminals, mixing into vessels, and special binning), but the prohibitions were tempered by the statement: "...except as may be authorized by order of the Commission." Thus the basic structure of the system was maintained, but with much greater flexibility to accommodate essential changes or take care of special situations. For the first time since it appeared in 1912, the Act implied that the Grain Commission was better able than

Parliament to deal with the evolution of the system.

The revised Act received royal assent on December 18, 1970, but was not proclaimed until April 1, 1971. On proclamation, the Canadian Grain Commission immediately gave notice of its intention to modify the statutory grades of wheat on August 1, 1971. Although this was considerably shorter notice than the eight months normally required by the new Act, the trade had been well briefed on the proposed changes and the necessary agreement of the Governor in Council was obtained to proceed on August 1.

The New Grades: The End of the "Manitobas"

The changes proposed by the Grain Commission were far-reaching and their implementation was made a step at a time over a two-year period. This minimized the problems faced by the Canadian Wheat Board in adjusting stocks and allowed the Grain Commission and the trade to adapt to the broad changes in handling procedures. The overall strategy was to combine the grades as follows:

1. No. 1 Manitoba Hard, No. 1 Manitoba Northern, and No. 2 Manitoba Northern were grouped into a new grade to be called No. 1 Canada Western Red Spring (C.W.R.S.).

2. No. 3 Manitoba Northern and the top of the No. 4 Manitoba Northern were to become No. 2 Canada Western Red Spring.

3. The bulk of No. 4 Manitoba Northern, No. 5 Wheat grade and four Garnet grades were to become No. 3 Canada Western Red Spring.

4. The former No. 6 Wheat and Feed Wheat grades were to become a "non-milling" grade to be called Feed or Utility Wheat.

The two top grades, which included all the high class milling wheat, were to be segregated at terminal elevators into three levels of protein, either 14%, 13%, 12% or 14.5%, 13.5%, and 12.5%.

The first step, which began August 1, 1971, was elimination of No. 1 Hard, No. 1 Northern and No. 2 Northern, and the creation of No. 1 C.W.R.S. At the same time segregation of this grade into protein levels of 15%, 14%, 13% and 12% was begun at Thunder Bay. The grade of No. 1 C.W.R.S. became effective simultaneously at Vancouver, but it was not segregated for protein until six months later, when the west coast levels were set at 14.5%, 13.5%, and 12.5%.

The second step, which occurred on schedule on August 1, 1972, was the elimination of the former grades of No. 3 Northern, No. 4 Northern, No. 5 and No. 6 Wheat, Feed Wheat, and the four Garnet grades, and the implementation of No. 2 and No. 3 C.W.R.S., together with three grades of Utility Wheat: No. 1, No. 2 and No. 3

Utility.

The No. 3 Utility grade was made up of the old No. 6 and Feed Wheat grades (see Figure 4). The No. 1 and No. 2 Utility grades were to accommodate licensed varieties of high yielding, so-called "non-bread" wheats which were distinguishable from the Marquis quality wheats; at the time there were two such varieties, Glenlea and Pitic 62. The No. 2 C.W.R.S. grade was also segregated into protein levels of 13.5%, 12.5% and 11.5% at both Vancouver and Thunder Bay.

By August 1, 1972 the last of the world famous "Manitoba" grades (as they were known everywhere outside Canada) had disappeared, to be replaced with the C.W.R.S. series which the British immediately nicknamed "Queers." While everyone in Western Canada appreciated the colossal reputation and prestige attached to the name "Manitobas", the farmers in Saskatchewan, who grew more than 50% of the wheat produced in Western Canada, felt some resentment about the continued use of the original grade names.

Effective Date	Old Grades	New Grades	Protein Segregation & Comments
August 1, 1971	No. 1 Manitoba Hard No. 1 and 2 Manitoba Northern	No. 1 Canada Western Red Spring (No. 1 C.W.R.S.)	Thunder Bay: 15%, 14%, 13%, 12% Vancouver: 14.5%, 13.5%, 12.5%*
August 1, 1972	No. 3 Manitoba Northern No. 4 Manitoba Northern (top of the grade)	No. 2 C.W.R.S.	Thunder Bay and Vancouver: 13.5%, 12.5%, 11.5%
	No. 4 Manitoba Northern (remainder of the grade) No. 5 Wheat No. 1, 2, 3, & 4 Garnet	No. 3 C.W.R.S.	--
	--	No. 1 & No. 2 Utility Wheat	High-yielding "non-bread" wheats
	No. 6 Wheat Feed Wheat	No. 3 Utility Wheat	--

*not effective until Feb 1, 72

Figure 4. Grain grade changes introduced in 1971 and implemented in 1971 and 1972.

With such a revolutionary change in the structure of the grades, the Grain Commission felt that the grade names should be changed simultaneously and so grasped the opportunity to apply the Canada Western grade designation which was already in use for most of the other cereals marketed from Western Canada.

The Implementation of Protein Segregation

When the question of selling wheat on a protein basis first came up officially in the 1928 and 1929 inquiries of the Standing Committee on Agriculture and Colonization, the term most often used was "protein grading." This term alone posed an immense problem, because it implied creating grades which would provide a predetermined minimum level of protein. Consequently any proposals prepared at the time foundered, especially since overseas buyers had indicated they would resist paying significant premiums for Canadian wheat sold on such a basis. The problems of establishing "protein grading" are only slightly less onerous today, because the concept carries with it the idea that the farmer will be paid for his wheat according to the protein level he delivers, and the wheat will eventually be sold to an ultimate buyer who will pay according to the protein level he receives.

By the mid-1960s it had become apparent that if we wished to maintain many of our traditional markets and break into new ones we would have to control the protein levels in our shipments of high grade wheat. With the technology then available it was possible to see how this could be achieved but it was not possible to see how, at any reasonable cost to the system, the farmer could be paid according to the protein levels of his deliveries to the country elevator. In the Western Canadian system a producer has the right to deliver his grain to a country elevator (restricted only by his quota) and he has the right to a proper grade and payment according to that grade. Thus "protein grading" would require an accurate protein test being made on the spot at the country elevator on all deliveries of wheat which qualifies for one of the two top grades. In 1971 this was not possible. (In 1982 it is possible, but still would be enormously expensive on the scale required in Western Canada.) Accordingly, the decision was taken to: (a) set aside the idea of paying individual farmers for the protein levels in the wheat they delivered, (b) continue the pooling system operated by the Canadian Wheat Board for each of the grades of wheat, and (c) move forward with the idea of segregating wheat, within each of the two top grades, into three or four levels of protein. It was realized that the protein levels might vary from year to year, but the system would enable minimum guarantees to be made as a basis for sales. Thus, although the Wheat Board would offer the different levels of protein at different prices (by labelling the grades as "No. 1 C.W.R.S., 14.5" or "No. 1 C.W.R.S., 12.5," etc), the total returns for all the wheat sold within the same grade would be pooled and shared by all producers delivering that particular grade. This philosophy was generally agreed upon by 1969 and the Canadian Grain Commission worked out the mechanisms to implement a system to achieve the segregation during 1970-71, using information garnered over the past 48 years.

Back in 1926, one of the first recommendations made by the newly formed Associate Committee on Grain Research was that the Grain Research Laboratory should carry out a survey of the protein content of the 1927 Western Canadian wheat crop. The grain companies operating country elevators cooperated by providing samples of the new crop of wheat they had obtained from farmers and these were used for the protein testing. The first survey was restricted to the "contract" grades (i.e. No. 1 Hard to No. 3 Northern) and the results were plotted on a map to indicate the general areas of high and lower protein. This harvest survey has been carried out every year since 1927, and the information has all been stored on computer tapes.

Following the Agriculture Committee's extensive hearings on protein content of wheat in 1928 and 1929, the Grain Research Laboratory also began to collect data on the protein levels of weekly average samples from the various inspection points in Western Canada. This eventually led, in 1939, to the establishment of a regularized statistical sampling at the "unload" points of all carlots of wheat moving in Western Canada, and this data has also been stored on computer tapes. A third survey - this time of ship cargoes - was begun in the early 1930s, following complaints about low protein in cargoes of No. 2 Northern from the West Coast. Thus by 1969 the Grain Research Laboratory had over 30 years of comprehensive data for: (a) the harvest survey, which dealt exclusively with new crop wheat; (b) the carlot unload survey, which dealt with crops from either the old or the new crop year, as they moved forward; and (c) the cargo survey, which indicated what went to the overseas customers each crop year.

With this information it was possible to simulate various proposals for segregation of protein on a computer, which was largely done at the University of Manitoba in 1969 and 1970. The carlot unload series became the main workhorse for the simulation studies and nine crop years which showed a wide range of grades, mean proteins, and bushel weights were selected for intensive investigation. Some of the problems revealed by this analysis were:

1. The average protein and the range of protein within the top grades varied considerably between unloads at the Pacific coast and unloads at the Lakehead.

2. There were significant differences between protein levels of carlots moved by the C.P.R. and the C.N.R., since they each served a somewhat different area of Western Canada.

3. There were quite wide differences between the unloads at each of the terminal elevators, both at the Pacific coast and the Lakehead, since the line elevator companies sent grain to their own terminals. Thus in most years the Saskatchewan Pool terminals at Thunder Bay ran considerably higher in protein level than the Manitoba Pool terminals, reflecting the

normally higher average protein content of the wheat crop in Saskatchewan.

The proposed system would have country elevator managers collect a representative sample of what was judged to be either No. 1 or No. 2 Manitoba Northern wheat that had been loaded into boxcars, and mail it to one of two major protein laboratories. If the carlot was to be moved to the Pacific coast, the sample would be mailed to Calgary; if the carlot was to be consigned to the Lakehead, the sample would be mailed to Winnipeg. It was assumed that first class mail would reach these centres some time before the boxcars reached their respective terminal elevators. By then, moisture, grade, and protein content would have been determined, and this information would be telexed to the terminal central offices to await the arrival of the box cars. The wheat would then be binned as one or another of the protein segregates, depending on the "bands" that were to be used to discriminate the various protein segregation levels.

The system was examined in the computer study, using three categories (or "bands") of protein content as primary criteria:

A - over 14.2% protein
B - 13.0 to 14.2% protein
C - under 13.0% protein

The study showed that for some of the years examined less than 1% of the 1 C.W. grade fell into the A category, while in others as much as 60% was in the A category. The B category held from 30% to 60% of the grade, and the C category was almost a mirror image of the A category, containing from 70% to 3% of the grade. In all years the A category averaged 14.5% protein or more and varied from 14.5% to 15.1%. The B category averaged from 13.4% to 13.8% over the years, while the C category averaged from 12.3% to 12.6%. From these data it was clear that the criteria for the three categories (bands) would have to be adjusted according to the average protein of the crop, to ensure that protein levels of 14.5%, 13.5% and 12.5% could be guaranteed.

The system was tested during the first half of 1971. For the preliminary computer studies only single data on carlots were available, and so an ideal system had to be assumed for protein testing (i.e. with no probable error). Next, the "real world" was examined: the primary samples from the country elevator agents were tested by the new Kjeldahl protein laboratory which had been set up in Calgary, and the unload samples which had been obtained from the terminals were tested by the central laboratory in Winnipeg. No bias was found in the primary samples; i.e. the mean protein of all carlots tested was essentially the same for the primary samples as it was for the unload samples.

An earlier preliminary run, however, had shown that when segregation was applied using the results of tests on the primary samples, an unanticipated bias resulted. Wheat in the highest protein segregate always turned out to be lower in protein content than predicted from the results of tests on the primary samples; the medium protein segregates showed virtually no bias; and wheat in the low protein segregates turned out to be higher in protein content than the primary samples showed. To the lay person this is a difficult phenomenon to understand: Several carlots of grain are tested before they arrive at a terminal, and then the same carlots are tested at unload with results which show that for some carlots the average values of the two series of tests agree, while for others they do not, and the results are consistently repeatable!

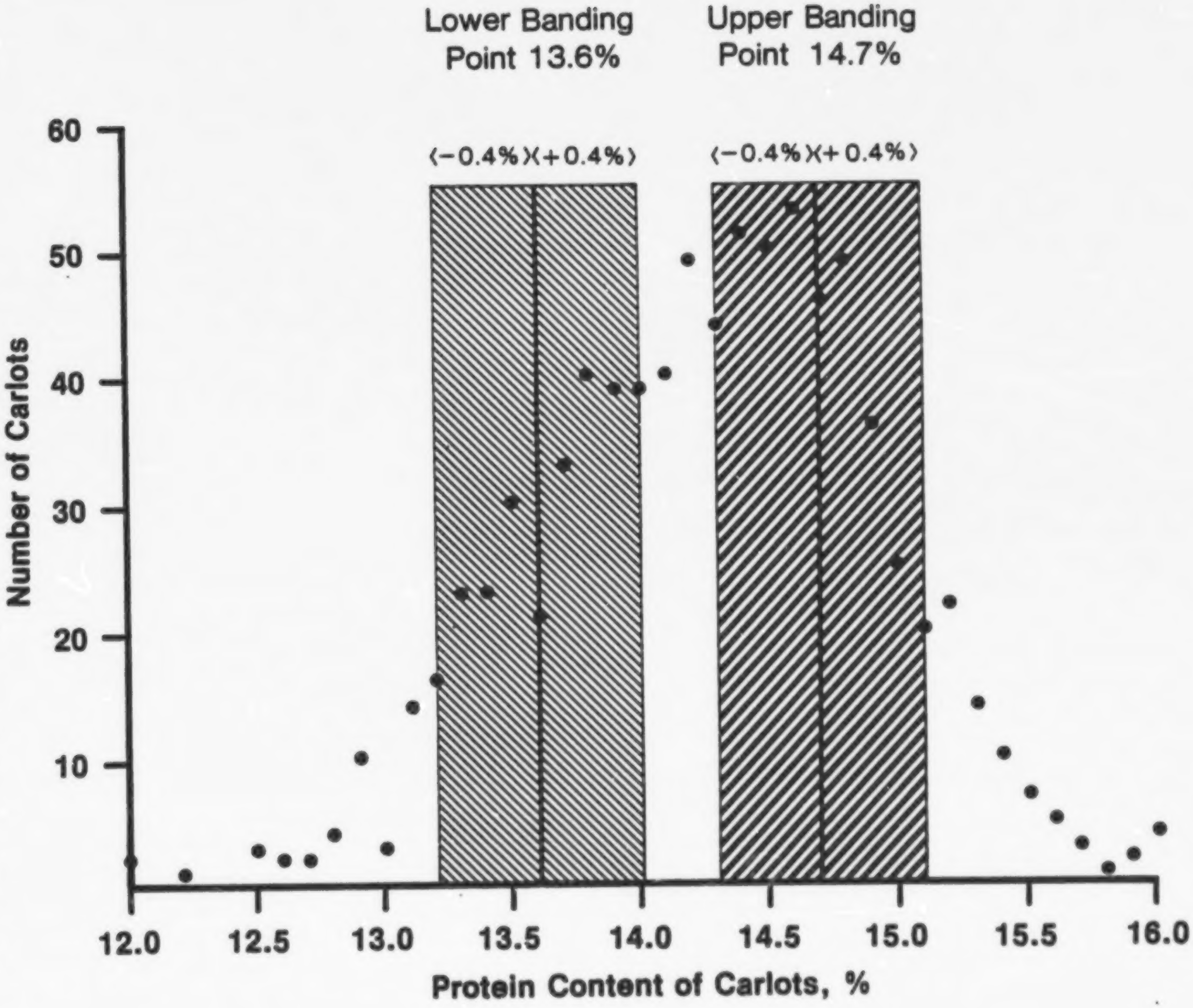
Similar phenomena to this had appeared in other statistical studies where scientists had attempted to segregate samples, on the basis of some cutoff value, from a widely varying population. The bias in the grain protein study occurs in the high and low segregations because the population of carlots in the immediate vicinity of the banding point does not show a normal or random distribution, but is itself highly biased. This phenomenon is illustrated by Figure 5, which contains actual data from deliveries of carlots of No. 1 and No. 2 Northern wheat to the Saskatchewan Pool terminals 8 and 10 at Thunder Bay during January 1971. The bias in the high and low segregates depends entirely on the overall error of the protein testing, including the test itself and the sampling error between the primary and the unload sample. This overall system error was found in the early studies to be ± 0.4% protein.

We are concerned, then, with the banding points and the region of the distribution curve ±0.4% protein from these points. These areas are shaded in the figure. From the actual carlot distribution, one can calculate that at the lower band (13.6%) there are 92 carlots which, because of the error, could be lower than 13.6% protein content, and there are 151 carlots which could be higher in protein content. This accounts for the bias towards a higher average protein level in the lower segregation of the "unload" grain at the terminal elevators, than expected from the data on the carlots segregated on the basis of the protein tests on the primary samples.

On the other side of the distribution curve the effect is reversed. Here, at the upper band (14.7%) we find that, because 130 carlots could be higher and 198 carlots lower in protein content, the mean protein level of the carlots segregated on the basis of the primary protein result is lower than expected. As the overall error in the results of the primary protein tests (i.e. the testing itself plus the sampling error) becomes less, the difference becomes less until the biasing phenomenon disappears when the error is zero. It is also apparent that the shape of the distribution curve influences the extent of the bias.

Since it was known that the distribution curve would be somewhat different at each terminal and would also vary over time, it was apparent that a fixed banding system could not lead to uniform segregation results. For example to ensure that the segregated unloads would always meet the guaranteed level with fixed banding, it would be necessary to set the banding point so high that most cargoes would exceed the guaranteed level by an excessive amount and so the quantities of high protein wheat available in the most desirable segregates (at 13.5% or 14%) would be considerably diminished. Accordingly, the system which evolved required separate banding at each terminal together with continuous monitoring of the mean protein levels of the segregated grains so that from time to time carlots could be promoted or demoted to maintain a reasonably uniform level just above the guarantee level. The major uncertainty in

Figure 5


Lower Banding
Point 13.6%
Upper Banding
Point 14.7%
(−0.4%)(+0.4%)
(−0.4%)(+0.4%)
Number of Carlots
60
50
40
30
20
10
12.0
12.5
13.0
13.5
14.0
14.5
15.0
15.5
16.0
Protein Content of Carlots, %

maintaining this operation was the size of the error in the overall protein determination.

The system was also vulnerable to late or non-arrival of a primary protein result at a terminal (i.e. after the arrival of the carlot) or, worse, to a postal strike which would prevent primary samples from being mailed in for testing. To minimize such effects, "station mean" data were calculated for each station in Western Canada, using the results of tests on the 10 most recent primary samples from each station, and these were updated weekly. Thus, if the primary data was unavailable on the arrival of a car at a terminal, the station mean value was ascribed to the car and it was binned accordingly. During a postal strike, the station means were used for all binning.

The use of station means, however, while better than having no primary test result, meant that the overall protein error would increase and thus the bias would be aggravated, leading to "giving away protein" to ensure protection of the guarantee. The guarantee was based on the series of protein results obtained by continuous sampling of wheat from the loading belts during the loading of a cargo. These "lot samples" were analyzed in duplicate at the central laboratory in Winnipeg and the guarantee was that the overall cargo would meet the guaranteed protein level determined by the Kjeldahl method in the Canadian Grain Commission laboratory (using the Nitrogen Conversion Factor 5.7, corrected to 13.5% moisture).

The biasing phenomenon described above was called the "Flip-Flop Factor" in the early months of its discovery, and it has retained this designation ever since. From the time of its discovery, continuing technological research has focused on improving and optimizing the segregation system to reduce the Flip-Flop Factor to the lowest possible level. This has involved reducing both the sampling error between primary and unload samples, and the error in the protein determination itself. When these errors become zero the Flip-Flop Factor becomes nil, and from the accumulation of primary protein data the exact protein content of the wheat in the shipping bins can be predicted.

A month before the protein segregation system was inaugurated at Thunder Bay in August 1971, the Neotec Corporation in the U.S. announced that it had developed a method using Near Infra-Red reflectance for measuring the protein and moisture content of grain. The measurement could be made in one minute, although the sample had to be ground and placed in a sample cup which took about three or four minutes. The Kjeldahl method, which was internationally recognized as the standard method for determining protein and was used during the early years of the test program, took more than 1 1/2 hours and used large amounts of strong acid and alkali, a digestion and distillation apparatus and significant amounts of mercury as a catalyst, all of which created serious pollution and disposal problems. During 1971 and 1972 an enormous number of Kjeldahl tests were carried out by the Grain Commission. In 1971, for example, 380,000 tests were performed, of which over 300,000 were done in Winnipeg. Large quantities of mercury-containing sludge had to be collected, concentrated, stored, and eventually shipped to Trail, B.C. for disposal. Fortunately, during 1972 a new, non-toxic catal yst was developed which partly resolved the disposal problem.

The enormity of the protein testing program was such that the University of Manitoba applied for and received a grant from the Federal Government to develop a method for using the university's Cyclotron for rapid protein testing. The process that evolved was demonstrated in early 1973 and was claimed to be economical for dealing with 500,000 to 1,000,000 samples per year. However, the infra-red reflectance method proved more economical.

Meanwhile, in late 1971 the Grain Research Laboratory received the first production model of the NEOTEC Grain Quality Analyzer and began the developmental research which ultimately resulted in the use of Near Infra-Red (NIR) protein measurement throughout the system, after which the Kjeldahl test was used only to monitor the system and confirm the protein level of cargoes. Although the NIR measurements would permit protein tests to be made at the terminal elevators as the carlots were being unloaded, there was a question of how closely the instruments could duplicate the Kjeldahl test, and of their reliability.

The first year of testing showed that the error in the NEOTEC Grain Quality Analyzer was higher than the manufacturer had claimed for the instrument, and that its downtime was substantial. The sample grinding system also left much to be desired, and the Grain Research Laboratory devoted considerable effort to finding a more effective method for grinding samples. Within the year, however, the manufacturer had corrected most of the major faults in the instrument that were uncovered by the Laboratory and the prospect of success became very encouraging.

Now that the longer term outlook for NIR measurements seemed good the Canadian Grain Commission entered into negotiations with the NEOTEC Corporation to build a custom version of the instrument which would be automated and run by a computer. It would be capable of turning out 2500 protein results in an eight-hour shift, and offered the prospect of measuring over one million samples per year. This instrument was delivered in late 1973 and was evaluated during the first half of 1974. It proved to be capable of taking much of the load from the Kjeldahl laboratory, and promised a sufficiently rapid service on analysis of unload samples that the data could be used to calculate the station means (in place of the primary data, which had been used until then because it was more "immediate"). By mid-1975 the Automated Digital Analyzer (ADA) had taken over all primary sample testing.

At the same time the Grain Commission was investigating whether the NIR instruments could be used in terminal elevators. So that simulation studies could be undertaken, instruments were installed in the terminals at Vancouver and staff were trained to use them. Simultaneously, systems were set up for rapid delivery of samples from arriving carlots to the terminal inspection office. The system went on stream at Vancouver on October 1, 1975, and initially experienced teething problems. Consequently, the use of primary test results, which had been discontinued in October, had to be reinstated in January 1976 and maintained for a further 12 months. The NIR system was reactivated successfully at Vancouver in January 1977, and 10 months later it was implemented at Thunder Bay, leading to the elimination of the primary sample system from November 1977.

Currently, all carlots of No. 1 and No. 2 C.W.R.S. wheat are binned at terminals using protein data determined on the spot with NIR instruments. The instruments are continuously monitored by small, rapid, automated Kjeldahl protein testers at the central inspection laboratories in Vancouver and Thunder Bay and these, in turn, are maintained in calibration by the central Kjeldahl laboratory of the Grain Research Laboratory in Winnipeg. As cargoes are "loaded out" from the terminals, lot samples are taken from the belts and monitored for protein by the NIR instruments, while the overall protein for each cargo is tested by the Kjeldahl testers. The protein banding at each terminal for each grade of wheat is determined weekly from data gleaned from the carlot unload samples which are sent back to Winnipeg for processing on the ADA.

The protein segregation system is by far the most complex modification of the wheat grading system ever undertaken by the Canadian Grain Commission. It has involved setting up large Kjeldahl protein laboratories at Calgary and Thunder Bay, plus additional laboratories in Winnipeg, greatly expanding the communications systems and personnel to staff the operation, and maintaining much closer and virtually continuous liaison with the Canadian Wheat Board. The Grain Research Laboratory became fully committed to the NIR system, carried out considerable research, and worked closely with the three American companies who were involved in its development. The Commission's elaborate program proved to be an excellent testing ground for the manufacturers, and each company in its turn had its instruments installed at the terminals in Vancouver. This greatly accelerated development of the NIR instruments and resulted in significant increases in their accuracy and reliability.

While the development of the protein segregation system represented a significant challenge for the Canadian Grain Commission, it also represented quite a challenge for the Canadian Wheat Board. The Board now had the most uniform-quality "package" of segregated grades of wheat in the world to market, but this was not achieved without creating some problems and headaches. Prior to August 1971, the Wheat Board had simply programmed its grade requirements for forward sales to the terminals, through the quota system and the allocation of rail cars to particular railway blocks. Now, if the Board had a requirement for a certain quantity of, for example, 1 C.W. 13.5, it would not know exactly where 1 C.W. 13.5 could be found in the country.

While data were available to indicate the average value of the protein in the various railway blocks, when cars were ordered forward to the terminals they often showed a wide variation in protein and would be segregated on arrival at the terminals into perhaps all three levels being segregated at the time. Thus in ordering up, say, 500 cars of 1 C.W. from a railway block that averaged 13.2% protein, it could be expected that more than half of the carlots would be segregated as 1 C.W. 12.5. As there might be no immediate market for 1 C.W. 12.5, valuable bin space would be tied up with wheat of temporarily unwanted protein levels.

Over the years the Wheat Board has become skillful at coping with these problems, but they will never entirely disappear. To alleviate some of the problems, in 1980-81 the Wheat Board began paying a premium to elevator companies shipping No. 1 C.W. 13.5 to the terminals. (This became the first step toward paying producers for high protein levels which, as one of the ultimate objectives of the segregation system, had been set aside initially.) Then, as 1 C.W. 13.5 becomes identifiable at the country elevator, the Canadian Wheat Board can more effectively call it forward and the producer can be paid for it. In the crop year 1980-81 the Wheat Board estimated that the grain companies paid producers a premium for 2.6 million tonnes of 1 C.W. 13.5 delivered to country elevators, and the Board paid elevator companies a premium for 3.3 million tonnes unloaded as 1 C.W. 13.5 at the terminals. Thus farmers received almost 80% of the premium paid for protein grain.

The most recent development in NIR technology, which may well speed up the installation of protein testing devices in country elevators, is an instrument which measures protein and moisture content on whole wheat kernels, thus eliminating the need for grinding the sample. This means that it is now possible to get a protein and a moisture reading on a sample of wheat in less than one minute, which is considerably less time than was formerly required to make a moisture test. But the instrument's high cost of about $10,000 limits its rapid adoption, even in those areas of the country where high protein wheat is normally grown.

How has the segregation system worked over the first ten years of its full implementation? The major objective was to identify and segregate the maximum possible quantities of 1 C.W. 13.5 for Canada's most sophisticated markets. In all but one of the first ten crop years quantities have been largely adequate to meet this demand. In nine out of the ten years customers have been able to obtain the quantities of 1 C.W. 13.5 they required, and the variation of protein within the grade over the years, and from cargo to cargo, has been remarkably small. Customers had to be quite severely rationed in the 1975-76 crop year, when two successive bad harvesting seasons severely reduced the quantity of 1 C.W.; fortunately, supplies of 2 C.W. 13.5 were sufficient to fill most of the gap.

Some of the other segregations have been less successful in assuring absolute uniformity of protein content. In some years the lowest protein segregate may range as high in protein as the next highest category; for example, the 11.5% may range as high as 12.5%. This variability has been relatively small, however, and painless compared to the variations that have occurred within one grade in the past, especially from year to year. For example, in the 15 years from 1954 to 1969 the protein levels in cargoes of No. 1 Manitoba Northern varied from 11.0% to 15.9% protein, and in cargoes of No. 2 Manitoba Northern it varied from 11.0% to 16.4%.

By comparison, during the first ten years following the segregation program the protein content of cargoes of No. 1 C.W. 13.5 varied only from 13.4% to 14.2%, while the quantity of that grade available in any one crop year varied from 1.14 to 7.72 million tonnes. Although our customers could not be sure that adequate quantities would always be available to suit their needs, they could be certain they would get what they wanted when they committed themselves to a purchase. Not all buyers needed such precise definition and assurance of specific quality, and somewhere between 20% and 60% of the wheat crop would have been available for them during

during the past ten crop years. Over this period, 91% of the wheat grown in Western Canada has been marketed, a significantly higher percentage than during any previous period.

Other Grade Changes

In 1972 the standard of quality in the top three grades of Amber Durum wheat was changed from the variety Mindum to the then recently licensed Canadian Durum variety Hercules. It was not until the late 1960s that the Canadian Durum breeding program really matured following the setback caused by the appearance of Race 15B stem rust. But when the new varieties began to appear, first Hercules in 1969, followed in subsequent years by Wascana, Wakooma, Macoun and Coulter, the quality and agronomic value of Durum wheat changed quite dramatically for the better.

The six grades of mixed wheat were rescinded at the beginning of the 1973-74 crop year. These had been introduced as commercial grades in the 1920s and became statutory grades in 1930. It was a time when producers were often moving from Red Spring to Durum wheat and back again to escape the stem rust epidemics, and sometimes the level of volunteer Durum found in Red Spring wheat, or vice versa, was sufficient to prevent the wheat from being graded into the normal grades. Similar conditions occurred with winter wheat, when it was sometimes necessary to re-seed in the spring with spring wheat, which in turn led to mixtures of red or white spring wheat with winter wheat, and vice versa. Modern husbandry methods have led to much improved control over volunteer admixtures and the Mixed Wheat grades are no longer necessary.

On August 1, 1977 the four remaining grades of No. 1 to No. 4 Alberta Winter wheat were deleted and replaced by three grades of Canada Western Red Winter. The former grade definitions had restricted No. 1 to Red Winter wheat, but the other three grades would accept any variety or color of winter wheat. The three new grades were now uniformly restricted to Red Winter wheat, the former No. 4 grade was eliminated, and the specifications were lowered modestly for the remaining three grades.

At the same time, the grade of Extra No. 4 Canada Western Amber Durum was deleted. This grade had been introduced in 1955 to take care of the varieties Pelissier and Golden Ball, which were not equal in quality to Mindum (or later Hercules) but continued to be grown for their drought and sawfly resistance. Newer varieties developed by Canadian plant breeders had almost completely replaced these older varieties by 1977, and the grade was simply redundant.

In the same year the Canadian Grain Commission established two Experimental Grades for wheat under the Canada Grain Regulations. These were intended to deal with new types or varieties of wheat which would be distinguishable from other classes, and provide some flexibility in the grading system. They also provided a legal position for varieties which did not fit into the present grades and permitted them to be grown and delivered to the Wheat Board for test marketing.

The following year (1978), two new grades of Hard Red Spring wheat were established, Extra No. 1 and Extra No. 2 Canada Western Red Spring. These differed from the current No. 1 and No. 2

C.W.R.S. grades only by the proviso that their protein content be 15% or higher. By then a number of country elevators had installed protein testing facilities, or for a modest fee farmers could submit samples of their harvest to the Canadian Grain Commission for a protein test. Thus the grades were the first experiment to determine how effectively high protein wheat could be segregated at country elevators and called forth to terminals when needed. This also was the first attempt at "protein grading" as opposed to protein segregation.

The experiment had only limited success, as the average protein content of the 1978 crop was rather low, at 13%. The first year 77,311 tonnes of Extra 1 C.W.R.S. were inspected into terminal elevators, of which 16,564 were exported; for the Extra 2 C.W.R.S. grade the figures were 4,050 tonnes and nil exported. In the second year (1979), 223,177 tonnes of Extra 1 C.W.R.S. were inspected with 102,618 tonnes exported; Extra 2 C.W.R.S. showed 12,127 tonnes being inspected, but again there were no exports. The experiment showed, however, that high protein wheat could be obtained from the country and binned at the terminals, but the demand for it was only modest.

The major problem was identifying the protein content in the country. The producer had the right to have his grain assigned the proper grade at the country elevator, but at the time protein testing facilities were not available at most country points. Producers could have representative stocks tested, and then negotiate the Extra grade with the elevator agent, or alternatively they could insist that a sample "subject to grade and dockage" be submitted to the Chief Inspector of the Canadian Grain Commission. The latter involved the Commission in a great deal of protein testing, and in a high protein year could mean in excess of one million protein tests being needed to ensure that producers entitled to the Extra grades would be paid for them. Since, over the two year period, the supply of Extra No. 1 and No. 2 C.W.R.S. considerably exceeded the demand, the grades were rescinded on August 1, 1980 when a different approach to paying producers for protein was initiated.

Experience has clearly indicated that the greatest demand is for 1 C.W.R.S. 13.5. In years when there is a generally higher protein level than 13.5, the highest protein wheat has to be segregated to maintain the proper level in the 13.5 classification. This higher protein wheat is then blended with lower protein stocks, as they become available in the terminals, to produce greater volumes of 1 C.W.R.S. 13.5. At present the Canadian Wheat Board pays the grain companies a premium for all cars of 1 C.W.R.S. 13.5 that are identified on unload into the terminals. The grain companies pay producers a premium on all deliveries known to be, or considered to be, 1 C.W.R.S. 13.5. Since 1 C.W.R.S. 13.5 is not a "grade," there can be no appeal by the producer against the elevator agent's decision, although the Wheat Board estimates quoted earlier (page 194) suggest that the producers are getting almost 80% of the premium generated by the Board's payments to the grain companies.

The most recent (1980) change in the wheat grades has been the deletion of the No. 3 Canada Utility grade and the creation of a class of Canada Feed with the same specifications. With this change the No. 1 and No. 2 Canada Utility grades also became a separate class.

The Current Grades of Wheat in Western Canada

After almost one hundred years, only 18 statutory grades are needed to handle the diversity of wheats grown in Western Canada. Currently these are:

3 Grades of Red Spring wheat
3 Grades of Red Winter wheat
5 Grades of Amber Durum wheat
4 Grades of Soft White Spring wheat
2 Grades of Utility wheat
1 Grade of Feed wheat

This is an all-time low. In 1885 there were 23 grades and at the apogee in 1970 there were 32 grades.

In the 1979-80 crop year the amounts of wheat (in tonnes) inspected into these grades were as follows:

	Tonnes	%
Red Spring wheat	13,584,087	79.1
Red Winter wheat	260,721	1.5
Amber Durum wheat	2,144,381	12.5
Soft White Spring wheat	191,843	1.1
Utility wheat	753,556	4.4
Feed wheat	622,903	3.6

The farmers of Western Canada overwhelmingly grow high quality Hard Red Spring wheat. The only other wheat that has achieved a significant level of production is Durum wheat, which generally yields about the same quantity per hectare as the high quality spring wheats. In recent years, however, the utility wheat Glenlea has been slowly gaining in popularity in certain areas where it yields well and it now represents about 5% of wheat production.

The main reasons for the small number of statutory grades are, largely, the highly adaptive varieties produced by Canadian plant breeders which have been licensed, and the good management practices of Western Canadian farmers. While frost can still have a deadly effect on wheat if it strikes before the crop is ripe, it happens very seldom nowadays and usually only affects a small percentage of any farmer's field. Rusts, smuts, bunts, root rots and other hazards to the proper filling and good health of the maturing heads of wheat have been largely controlled by developing immunity in the varieties. And, more and more, the effects of poor harvest weather are being to some extent mitigated by combining at high moisture levels and drying the crop in an artificial dryer. Thus the need for large numbers of grades to take care of special situations has largely disappeared.

References:

1. V. Martens and I. Hlynka, Protein Content of Canadian Wheat 1927-1968.
   Winnipeg: Canada Department of Agriculture, 1969.
2. 19 Eliz. II Ch. 7 (1970)

APPENDICES

APPENDIX A

The Vehicles of Federal Legislation Dealing with the Grading and Handling of Wheat

The earliest legislation was in 1863, which was "An act respecting the inspection of wheat and other grain". A consolidation after Confederation referred in 1873 to "...the inspection of certain staple articles of Canadian produce". This became known as the *General Inspection Act* in 1874, and all legislation from then through 1899 was via amendments to it.

In 1900 the *Manitoba Grain Act* was passed, establishing government control over grain handling in Western Canada. This further expanded the federal government's intervention in the grain business, from the already quite extensive provisions legislating grading contained in the 1899 revision of the General Inspection Act. In 1904 the *Inspection of Grain Act* repealed the sections of the General Inspection Act that dealt with grain and attempted to consolidate government regulations not covered in the Manitoba Grain Act. This led to the curious situation that under the Inspection of Grain Act a farmer could appeal the grading of his grain by the country elevator agent to whom he offered it for sale by submitting a two quart sample of the grain to the Chief Grain Inspector. At the same time the Manitoba Grain Act gave the same farmer the same right to appeal the dockage assessed on the same grain at the same country elevator, but required he submit a three quart sample!

In 1908 the appeal privilege contained in the Inspection of Grain Act (which by then was known as the *Inspection and Sale Act*) was repealed and the Manitoba Grain Act was revised to include an appeal for grade with the dockage appeal provision.

The *Canada Grain Act* of 1912 combined the provisions of the two acts and all subsequent legislation dealing with grading and handling of grain in Western Canada has been via amendments to this Act.

APPENDIX B

The Role of Science and Technology in the Evolution of the Wheat Grading System

The quality of the variety Red Fife played a dominant role in the establishment of the first grades for Manitoba wheat in 1885. Amongst those who early appreciated the value of this high quality wheat to the expanding western Canada wheat economy was Professor William Saunders, who established and directed the Dominion Experimental Farms system from its inception in 1886. Saunders clearly recognized two major factors in the development of a staple wheat exporting economy for the West:

1. There were very limited areas of the world where wheat of the quality of Manitoba grown Red Fife could be grown, and we should take every means to exploit this advantage.

2. The development of Western Canada would lead to the production of immense quantities of wheat which could not be absorbed by the local population and would have to be moved great distances by rail and water to put it into position for export. Thus, he reasoned, we must grow the highest quality product possible, which would be able to bear the high costs of moving it into world markets.

Saunders rapidly became aware that the major hazard to the wheat crop in Manitoba was frost in the fall. In 1885, for example, only 10% of the crop graded into the new statutory grades while 90% was graded into specially established Frosted Wheat grades. One of Saunder's earliest projects was to find, somewhere in the world, a variety of wheat "...of good quality, equal if possible to the Red Fife, so much esteemed, with an earlier ripening habit, so as to lessen the loss which early frost sometimes entails on the vast wheat crops of Manitoba and the North-West Territories."[1] He brought in wheat from all over the world but found only one, from Northern Russia, that looked promising. It was the variety Ladoga which, in trials at the newly established experimental stations in Western Canada, appeared to mature about 10 days earlier than Red Fife. But it was not until 1892 that Saunders was able to get a carlot of the variety, which had been grown near Prince Albert, for commercial milling and baking trials. The trials showed Ladoga to be very inferior to Red Fife, so he turned to the technique of cross-breeding, following the newly rediscovered work of Mendel in Austria, to achieve his goal.

In 1892 one of Saunders's sons, Dr. A. P. Saunders, was sent west to begin a crossing program at Brandon, Indian Head and Agassiz. Over ten years later another of his sons, Dr. Charles E. Saunders, was named Dominion Cerealist and began the work of examining and selecting promising lines from the seed of these crosses, which had been grown in Ottawa. The selection criteria were earliness, high yield and a quality assessment made by throwing a handful of the wheat in the mouth and chewing it. From this latter test Charles Saunders, who was by now an expert, concluded that one of the new early ripening hybrids had qualities similar to Red Fife. That same year he set up the first wheat quality laboratory in Canada at the Experimental farm in Ottawa, where tests of milling and baking quality could be made on small samples of new wheat varieties. Such tests confirmed the potential of the newly selected cross which was to be named Marquis and which was released for commercial production in 1909.

By 1929, only twenty years later, it was estimated that over 85% of the Spring Wheat acreage in North America was planted to this variety. It replaced Red Fife as the variety named in the statutory grades of wheat in 1925 and is still the standard of quality for Western Canadian Hard Red Spring wheat.

Charles Saunders, with his wheat quality Laboratory in Ottawa, became not only Canada's first Cereal Chemist, but the only Canadian plant breeder who had conducted his own quality evaluations on the results of his breeding work. He conducted careful studies on the quality of the many exotic varieties that were being used in the breeding program and was able to advise the Inspectors which varieties could be considered to be the equal of Red Fife for grading purposes.

With the establishment of the Board of Grain Commissioners in 1912 there was seen to be a need for a scientific arm for the Commission. In their first annual report, for 1912, the Commission recommended the establishment in Winnipeg of a Laboratory for testing the milling and baking qualities of Western grain in order to assist the Inspection branch to set proper quality criteria in the grades of grain. This recommendation was accepted by the Department of Trade and Commerce but in the implementation, it turned out that the Director chosen for the Laboratory, Dr. F. J. Birchard (probably the most highly qualified man in Canada other than Saunders himself) refused to work under the Grain Commissioners but insisted on reporting directly to the deputy minister. This arrangement was accepted and continued from the inception of the Dominion Grain Research Laboratory, as it was called, in late 1913 until 1925. Then, following a recommendation of a Royal Commission, the Laboratory was reorganized on a larger scale and moved into the Winnipeg Grain Exchange Building where the Inspection department also was located. From 1925, the Laboratory was directly responsible to the Grain Commissioners.

In the early years there were three basic problems regarding wheat. Perhaps the most obvious was the evaluation of varieties being grown by farmers for their intrinsic milling and baking qualities so that Inspectors and elevator grain buyers could be advised which varieties were considered as equal to Red Fife for grading purposes. Saunders had begun this work and later, during the mid-1920s, it was shared with the Grain Research Laboratory and with laboratories at the three prairie Universities, under the sponsorship of the Associate Committee on Grain Research.

The second problem was that of determining safe moisture limits for storage and handling of wheat. Dr. Birchard, the chief chemist of the Dominion Grain Research Laboratory, began this work soon after the Laboratory was set up and it culminated four years later, in 1917, when a cargo of wheat was shipped from Vancouver to the United Kingdom via the Panama canal to test the conclusions of the study. The cargo consisted of wheat at various moisture levels and each hold was wired with thermocouples to measure temperature changes in the bulk of the various parcels of wheat. Dr. Birchard travelled to the U.K. to await the arrival of the ship, while his principal assistant (Mr. Chaunce Alcock) travelled with the cargo to observe its behaviour throughout the passage. The conclusions reached at that time have held up and are still valid today.

The third problem, and the most complex, was that of relating degrading factors to actual milling and baking performance. The reasons for the complexity were twofold: (1) the variable needs of hundreds of different buyers of the same grade of wheat all over the world, and (2) the continuously changing technology of the milling and baking industries in various parts of the world. Certain grading factors which are of no concern to a buyer in one part of the world may be crucial to a buyer in another part of the world. This problem is still under investigation today.

Research aimed at supporting the western wheat economy began with Saunders' laboratory at the Ottawa Experimental Farm, was expanded by the establishment of the Dominion Grain Research Laboratory, and had a more theoretical arm added by the establishment in the late 1920s of a cereal chemistry laboratory in the Applied Biology section at the National Research Council in Ottawa. The federal government funded all three of these operations, much of the plant breeding work, and the work of the plant pathologists who were unravelling the secrets of the rust epidemics which were devastating the prairie wheat crop. And in 1926, under the sponsorship of the National Research Council, three Associate Committees were set up to co-ordinate research programs in plant breeding, plant pathology and grain quality research which were being undertaken by federal, provincial and industrial laboratories. Through the Council, funds were made available to each of the three Committees to allow them to sponsor needed research programs, usually at Universities. This system of co-ordination was very effective over the next 30 years. During the first 10 years of the co-ordinated program, a system of collaborative testing of new wheat varieties was developed, and this format is still in use today. The Grain Quality Committee reaches a collective decision on which of the new varieties of wheat are "equal in quality to Marquis" and this information is passed along to the Canadian Grain Commission (the former Board of Grain Commissioners) and to the licensing arm of the Canada Department of Agriculture.

The criteria used to decide whether a newly developed variety is "equal in quality to Marquis" have evolved primarily through the program of basic and applied research undertaken by the Grain Research Laboratory of the Canadian Grain Commission. This work was, and still is, conducted in close liaison with scientists in the major wheat importing countries to ensure that the needs of these markets are recognized.

Under the stimulus of funding made available through the Associate Committee on Grain Research, excellent cereal chemistry units were established at each of the three prairie Universities (Manitoba, Saskatchewan, and Alberta). These units took a very active part in the work of the Grain Research Committee until the mid-1950s when the method of funding the research programs was taken out of the hands of the Committees and was administered to the universities by a Committee in Ottawa, based on general research proposals submitted by the three Universities. As it was a time when basic research programs were popular with those who decided where the funds should be allocated, the research proposals made on behalf of programs proposed by the Associate Committee soon languished. Lacking the stimulus of reasonable financial backing, the cereal chemistry units at the Universities of Manitoba, Saskatchewan and Alberta withered away.

The development of the new cereal species, Triticale, brought a new stimulus to cereal chemistry at the University of Manitoba in the mid-1960s and an excellent unit is continuing to function in the Plant Science department there. The two other Universities have never recovered their former interest in cereal research.

Immediately following the end of World War 2, the National Research Council in Ottawa closed down its cereal chemistry section with the recommendation that the research be concentrated at the Grain Research Laboratory in Winnipeg. As a result, the staff of the Winnipeg Laboratory was considerably expanded after the war and it has become the major centre for cereal quality research in Canada. Undoubtedly its considerable expansion also had something to do with the demise of the cereal chemistry units at the Universities. It is fortunate that the University of Manitoba has managed to sustain and expand its teaching and research facility in cereal chemistry, since research in this vital area is enhanced by independent viewpoints.

Reference:

1. Experimental Farm Bulletin No. 2, December 15, 1887.

APPENDIX C

The Quality "Enhancement" that Occurs with Blending Different Parcels of the Same Grade of Wheat

In wheat grading systems there can be a number of reasons why a particular parcel of wheat may not obtain the top grade, and the reasons normally increase as the grade decreases. These reasons are caused by some aberration during the growing, harvesting and/or storage period which results in the wheat being less than perfect. In many instances it may be only one or two factors which are responsible for a parcel of wheat being graded down from the top grade to the next grade. Locally - at a country elevator - similar factors are likely to cause a number of farmers' deliveries to be degraded, whereas at a terminal, where deliveries arrive from all parts of the country, there will usually be a wider spectrum of defaulting factors in any particular grade.

For example we could imagine, at the turn of the century, four carlots coming into a terminal at Fort William, each from a different region of the prairies and each grading No. 3 Manitoba Northern. Car No. 1 is shipped by a large farmer who suffered from drought conditions during the ripening season and his wheat is excellent except that the bushel weight is low, too low to be graded No. 2. Car No. 2 contains wheat that was poorly stacked and has some sprouted grain in it, but is otherwise good; the degree of soundness is too low for No. 2 and so it grades No. 3. Car No. 3 contains fine wheat but it has an admixture of weeds, chaff, barley and wild oats that is too much for No. 2 and so it also grades No. 3. And car No. 4 also has nice-looking wheat which previously contained smut and has been scoured to remove it; such wheat can be graded no higher than No. 3. If all these four carlots are blended together, the resulting blend will likely meet the requirements for No. 2 or in an extreme case even No. 1. Its bushel weight is now satisfactory, the percentage of sprouts is only one quarter of that of the sprouted car, the admixture is now at a quite reasonable level through dilution and no one can now detect that some of the wheat has been scoured to remove smut.

When farmers hear about what happens in cases of this sort in the large warehouses storing wheat for major markets, they cry "injustice" and demand more grades and "special" grades to recognize the "blending value" of the wheat they supplied which has not made the top grades. Yet the legislation of 1899 forbade mixing of different grades in public terminal elevators and required a grade from a private elevator to meet the standard of the public elevators on shipment out. This represented a decision to preserve the enhancement of quality that naturally occurs on blending different cars of the same grade at terminal elevators. This decision has been further reinforced through the establishment of Export Standards which ensure that the enhanced quality achieved through blending within each grade will be passed on to the overseas buyer.

POOR
QUALITY
ORIGINAL